Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

APRIL 5, 1948
VOLUME 37, No. 7

AMERICAN DYESTUFF REPORTER

A new Solophenyl Color

Geigy announces the addition of a new and most interesting Solophenyl* dyestuff

*Solophenyl Dark Green G B L***

whose self-shade is most desirable and whose use as a shading element on Cotton or Rayon gives a wider application to the Solophenyl series.

Solophenyl Dark Green G B L besides offering the extreme in light fastness, characteristic of the Solophenyl series, is influenced in the minimum by anti-crease finishes. Those mills producing mixed upholstery fabrics will also like its lack of affinity for the wool fibre.

Other desirable features include its fastness to perspiration, water, salt water, dry and wet cleaning.

Bulletin #9 G gives the complete story of this new and most interesting Solophenyl Dark Green G B L.

*Registered U. S. Patent Office.
**Patented.

GEIGY COMPANY, INC.

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it combines the most in softness and fullness with the least in shade change and effect on light fastness.

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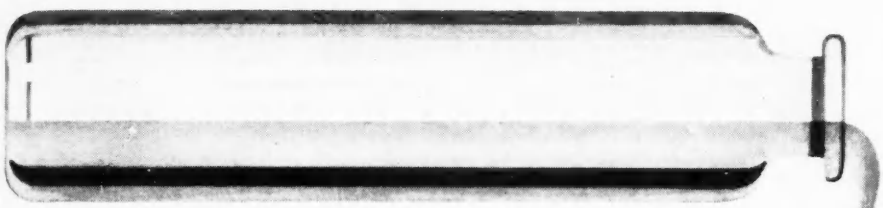

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Emery announces the availability in commercial quantities of a group of fatty acid esters light in color with high mono-ester contents and low amounts of the alcohol and free fatty acid.

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GDC

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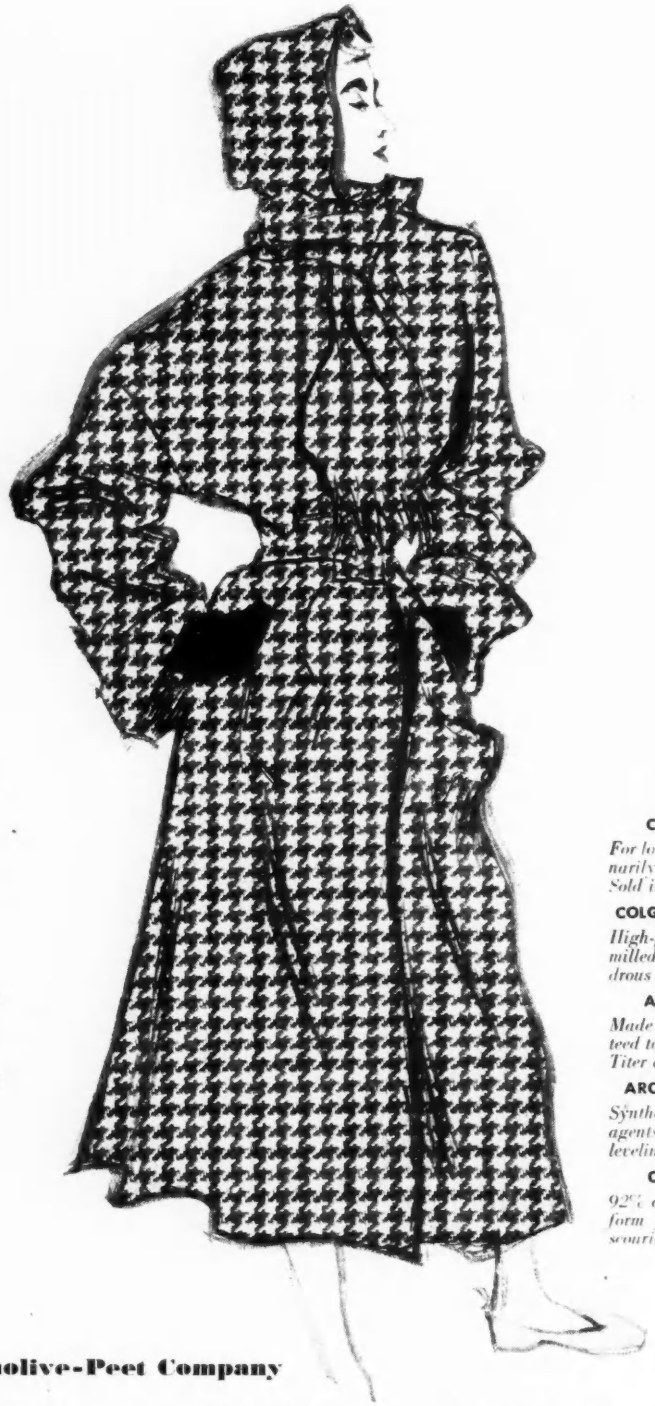
From years of experience, textile processors realize that the *buy* appeal of fabrics depends greatly on proper processing.

That explains why so many of America's leading mills, converters, finishers and dyers have turned to Colgate-Palmolive-Peet for high-quality wetting, fulling, scouring and dispersing agents.

Remember, there is a C.P.P. soap or synthetic detergent for every type of fabric—for every processing problem. Ask your local Colgate-Palmolive-Peet representative for details. Or, write today to Industrial Department, Colgate-Palmolive-Peet Company.



Bold checks are the fashion for cold weather. Photographed here, a new fabric in 100% wool. Broken hounds-tooth weave with Royal and Navy blue check on natural background.

COLGATE FORMULA 25

For low-temperature washing ordinarily requiring olive oil soaps. Sold in eastern states only.

COLGATE WHITE SOAP FLAKES

High-grade thin white flakes. Not milled or polished. 90% anhydrous soap.

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Synthetic detergents and wetting agents. Have specially desirable leveling effect in dyeing.

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92% oleic acid soda soap in flake form for silk degumming, wool scouring, all textile processing.

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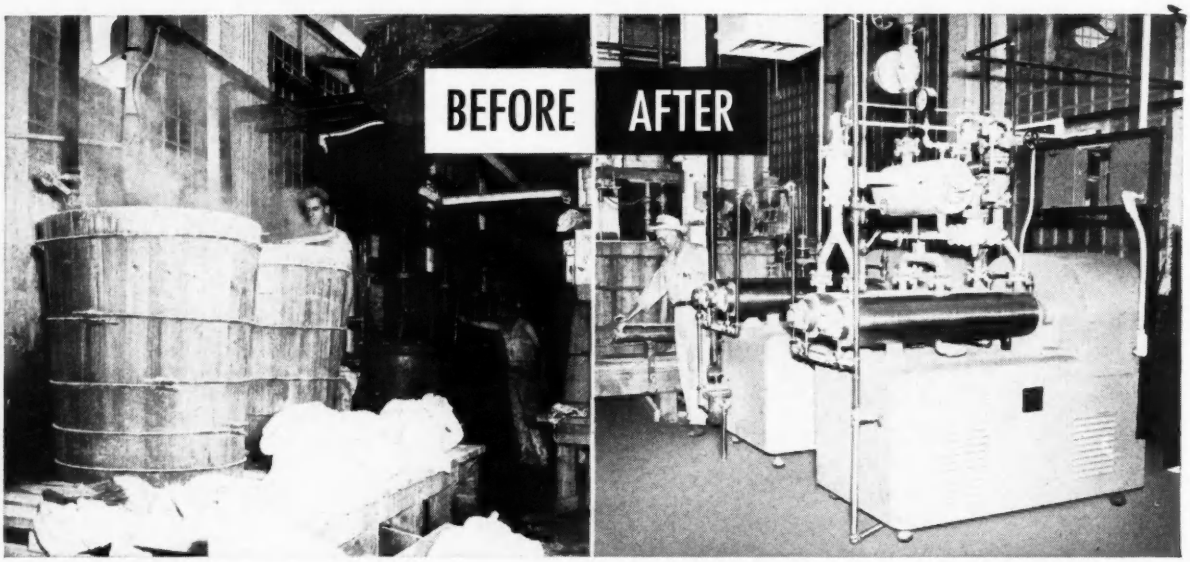

Starch Paste Processing History at Hartsville, South Carolina

For years the sloppy, slow, wasteful, hit-or-miss kettle method of processing starch paste has been an anachronism in the progressive textile industry.

But now the job has been cleaned up, speeded up, and given quality control—thanks to VOTATOR apparatus functioning on a continuous, closed basis at significant savings in time, labor, material, floor space, money. Compare the above "before" and "after" pictures, taken at the Hartsville Print & Dye Works Division of the United States Finishing Company. The VOTATOR installation at the right is spic and span, and then some!

It produces a superior, uniformly smooth, homogeneous starch paste for naphthol colors with 15% less starch than required by the old kettle equipment shown at the left.

It requires only 15 man-hours per 3000 gallons of finished paste per 20-hour day, in sharp contrast to 40 man-hours formerly required.

It occupies one-third the floor space formerly needed.

It uses heating and cooling mediums more economically than ever before.

It is virtually automatic, with positively no spilling over, no possibility of contamination, no entry of foreign matter.

In addition to starch paste for naphthol colors, vat reduction paste and vat standard paste at Hartsville are processed with VOTATOR apparatus—even more advantageously in some respects. Write for details.

THE GIRDLER CORPORATION, VOTATOR DIVISION, LOUISVILLE 1, KY.

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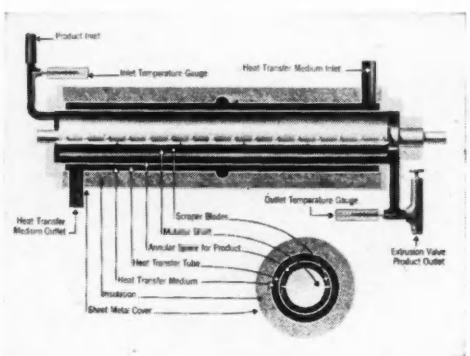

Cutaway view of closed cylinder assembly of a VOTATOR processing unit, used in Hartsville's improved system for preparing starch paste for printing gum—a tube assembly of unique design that provides an extraordinary high rate of heat transfer. Starch-water slurry, pumped into the annular space between shaft and heat transfer tube, is instantaneously heated or chilled, and discharged at the other end under pressure at the required temperature. Scraper blades on the rapidly revolving mutator shaft keep the heat transfer surface clear of the insulating film that would otherwise impede heat transfer. This cylinder assembly can be cleaned in ten minutes simply by introducing room-temperature water for that period.

Votator — INDUSTRIAL STARCH PROCESSING APPARATUS

VOTATOR is a trade mark (Reg. U. S. Pat. Off.) applying only to products of The Girdler Corporation

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For Wetting and Rewetting

Here are two blue-ribbon surface-active agents which, together, satisfy all your wetting and rewetting requirements.

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Newly improved — highly effective in acid and alkaline solutions — clear, amber color — resists inorganic salts.

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Newly improved — highly effective in acid and neutral solutions — clear, golden color — resists inorganic salts — ideal for rewetting.

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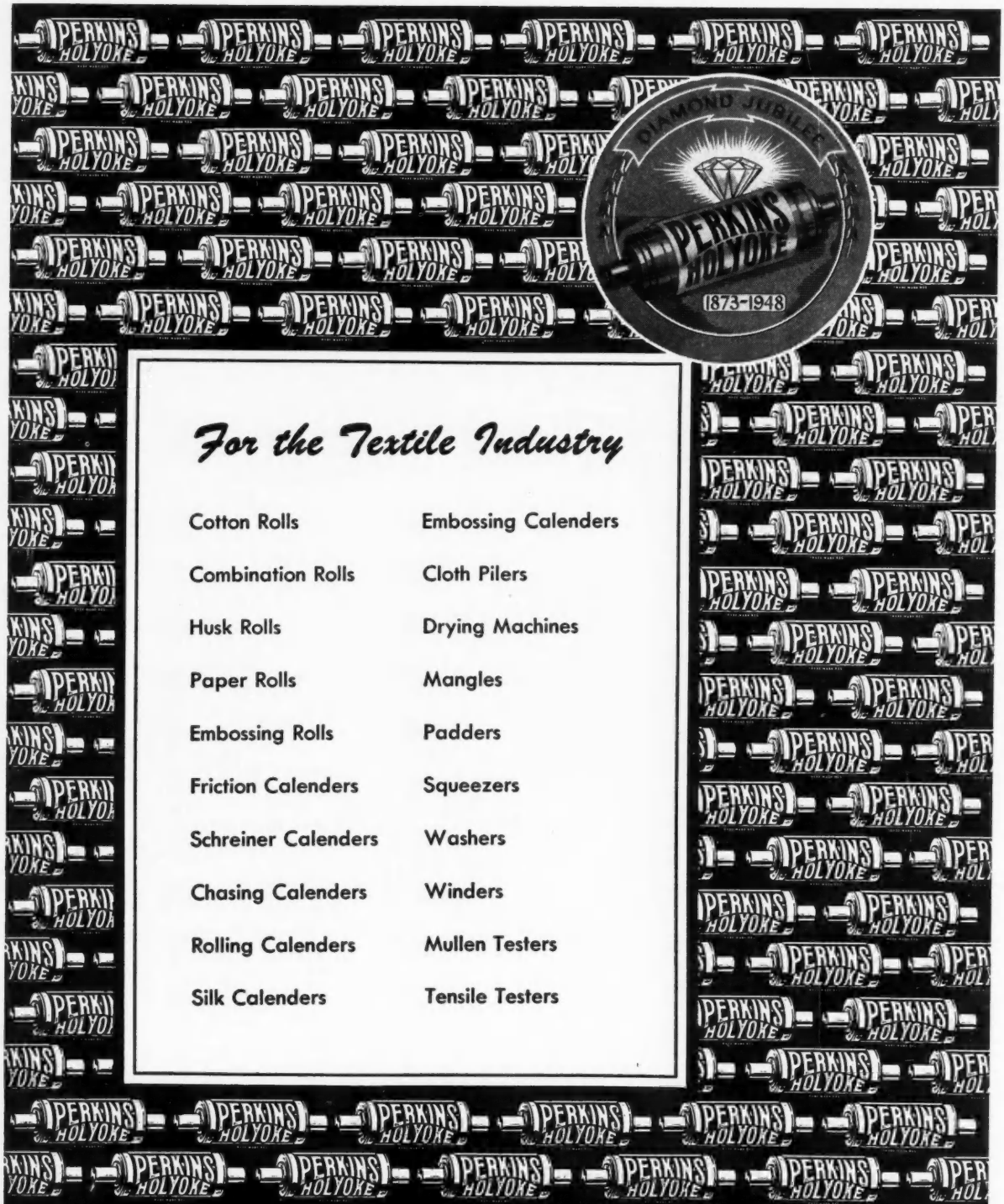
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"It's one of them, Mr. Jones—the Niagara Falls plant."

Yes, Mr. Jones and there's another at Saltville, Va., to serve the southeast, and a third at Lake Charles, La., serving the southwest. With three plants, Mathieson offers triple flexibility in deliveries of caustic soda. Call it three sources of supply. That's why weather, breakdowns, railroad or labor conditions seldom keep Mathieson from making prompt deliveries.

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Calgon*

prevents the formation

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To safeguard your operations from uneconomical side reactions due to impurities of reactants, use uniformly high purity sulfides from Hooker.

Technical data sheets and test samples may be obtained when requested on your company letterhead.

SODIUM SULFIDE Na_2S

Description: Light yellow colored solid in flake form. Rapidly soluble in water; slightly soluble in alcohol; insoluble in ether.

Physical Data:

Mol. Wt.	78.1
M. P.	100° C

Analysis

Na_2S	60 to 62%
NaCl	1.5% Max.
Other Na Salts	2.0% Max.
Fe	8 ppm Max.
Cu, Ni, Cr, Mn, Pb	1 ppm Max.
Water of crystallization	36.5 to 34.5%

Uses: In unhairing hides and wool pulling; desulfurizing viscose rayon; in manufacture of dyestuffs, chemical intermediates, paper pulp, special glass, soap and rubber; as an ingredient of dye liquor for textile dyeing; in calico printing, boiling out linen; ore flotation and metal refining.

Shipping Containers: Steel drums ..... 90 and 350 lbs. net.

SODIUM SULFHYDRATE NaSH
(sodium hydrosulfide)

Description: Light lemon colored solid in flake form. Completely and rapidly soluble in water, alcohol and ether.

Physical Data:

Mol. Wt.	56.1
M. P.	55° C

Analysis

NaSH	70 to 72%
Na_2S	0.25 to 2.5%
NaCl	0.4 to 0.8%
Na_2SO_3 and $NaHCO_3$	0.04 to 0.4%
Fe	5 ppm Max.
Cu, Ni, Cr, Mn, Pb	1 ppm Max.
Water of crystallization	28 to 26%

Uses: In unhairing hides, in desulfurizing viscose rayon; in preparation of dyestuffs and other organic chemicals such as thioamides, thiourea, thioglycolic acid, thio- and dithiobenzoic acids, sodium thiosulfate.

Shipping Containers: Lacquer-lined steel drums ..... 90 and 350 lbs. net.

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provide the answer to the demand for
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in double powder
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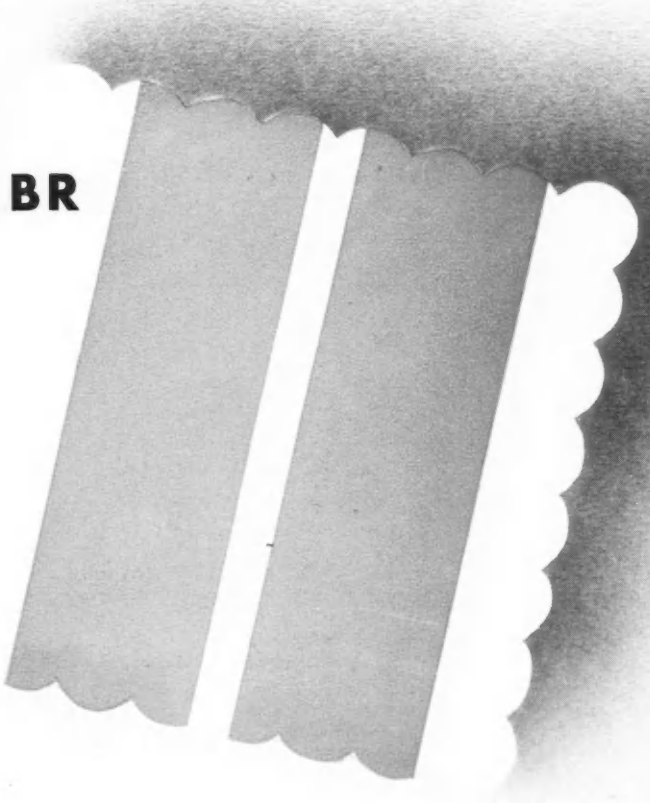

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The self-fulling, self-scouring wool oil whose remarkable versatility is proven daily in countless woolen mills, on all woolen processes.

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. . . NOPCO FUA cuts down fly . . . won't gum or load the cards. It makes possible longer runs before stripping. It helps preserve natural life and cushion of the leather rub roll aprons, giving you a loftier, rounder roving. NOPCO FUA is non-corrosive. In short —NOPCO FUA makes possible extensive savings in time and equipment.

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IN THE DYEING PROCESS

. . . On piece dyes, the minute residuum of NOPCO FUA (0.2% or less) is an actual aid to level dyeing. NOPCO FUA is a leveling agent in its own right.

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. . . NOPCO FUA achieves remarkable results when used alone. No soaps or detergents are required. (Small amounts of a polyphosphate solution added to the soda ash solution enhance sudsing.) Goods slide better in the fulling mill . . . tangles or knock-offs are prevented. Further, NOPCO FUA produces quick, uniform shrinkage and reduced rinsing time.

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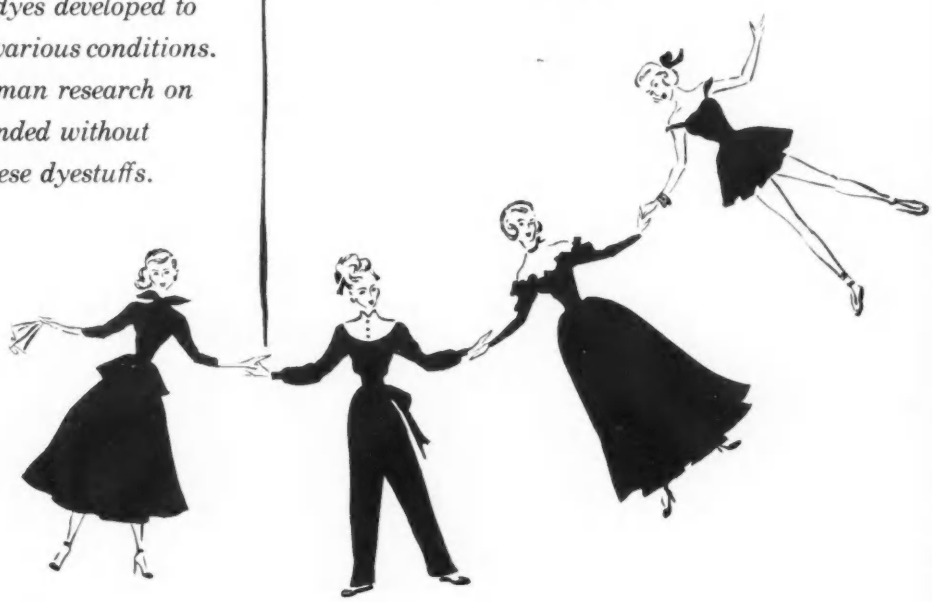
Produced for synthetic fabrics, Eastman Acetate Dyestuffs are available in a variety of colors for practically every method of dyeing and printing. There are dyes well adapted to discharge or application printing. Other Eastman Acetate Dyestuffs can be used on both jig and box, at either high or low temperatures, with excellent build-up and leveling properties. Fabric dyers may take advantage of the special fastness properties of Eastman dyes developed to withstand fading under various conditions. The full benefit of Eastman research on dyeing problems is extended without obligation to users of these dyestuffs.

Eastman Acetate Dyestuffs are sold in the United States through Tennessee Eastman Corporation in Kingsport, Tennessee, and Lodi, N. J.; in Canada, through Clough Dyestuff Company, Ltd., 33 St. Mathieu Street, St. Laurent, Quebec.



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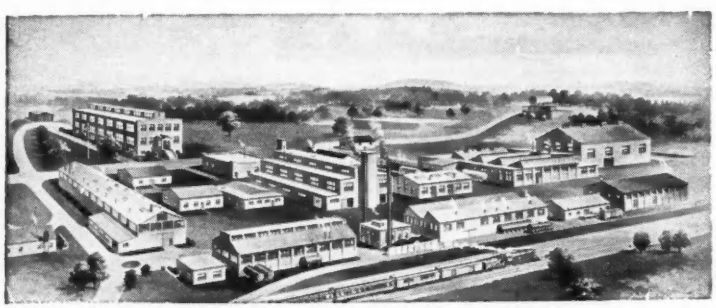

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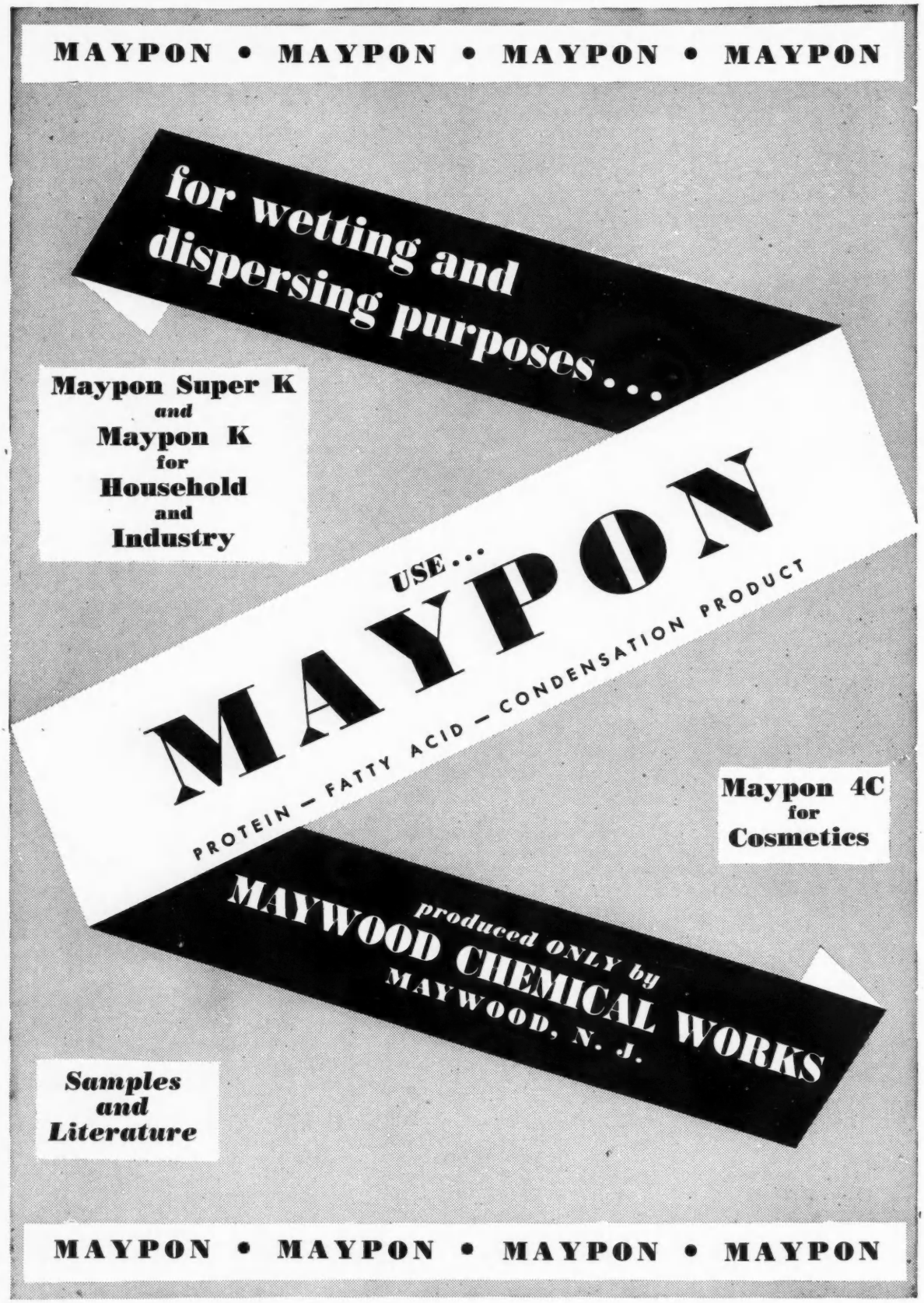
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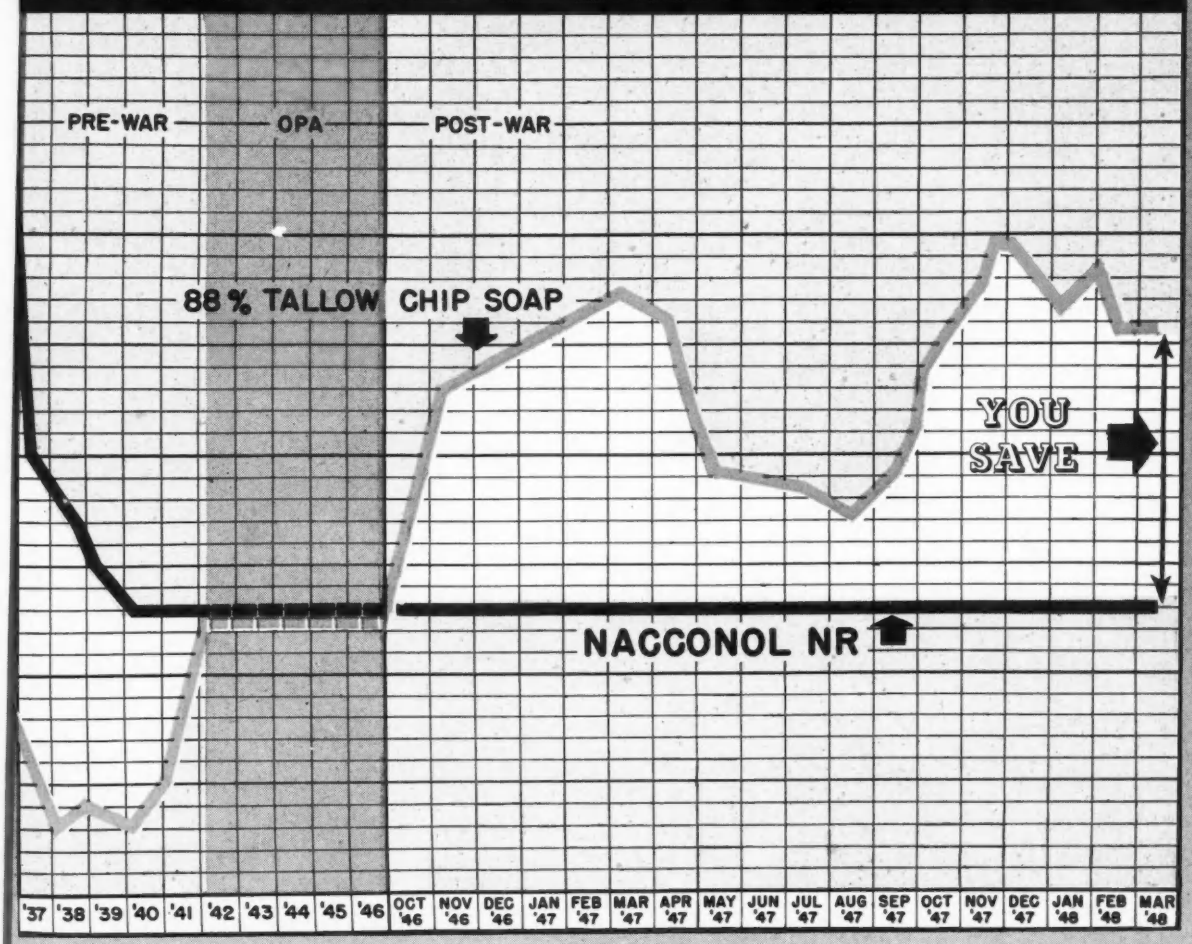
Mill Executives: Save on Soap Costs by switching to NACCONOL* NR

COST COMPARISON - NACCONOL NR vs SOAP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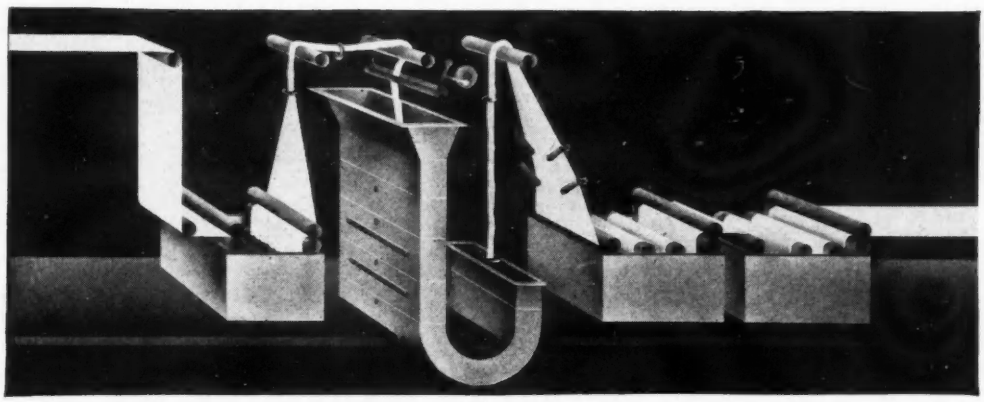

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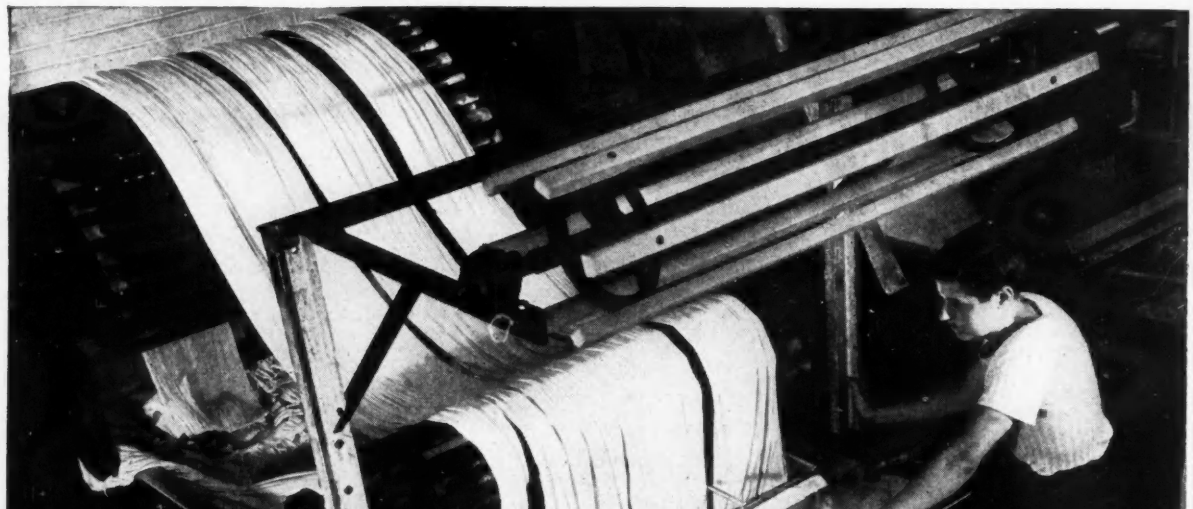

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Glauber's Salt, Crystal $Na_2SO_4 \cdot 10H_2O$ *(Sodium Sulfate)*	Colorless Crystals	96% $Na_2SO_4 \cdot 10H_2O$ 42.3% Na_2SO_4	Bags	Dyeing assistant.
Glauber's Salt, Anhydrous Na_2SO_4 *(Sodium Sulfate)*	White Granules	99.5% Na_2SO_4	Bags	Same as crystal but stronger product.
Sulfuric Acid H_2SO_4	Liquid	66° Be 93.19% H_2SO_4	Carboys Steel Drums Tank Trucks Tank Cars	Carbonizing wool; dyeing; desizing cotton; souring; rayon spinning bath.
Acetic Acid CH_3COOH + water	Colorless Liquid	Various	Carboys Barrels Tank Cars	Dye bath; souring agent; imparting scroop to cotton and silk.
Aqua Ammonia NH_4OH + water *(Ammonia)*	Colorless Liquid	26° Be 29.4% NH_3	Carboys Steel Drums	Wool scouring; dyeing.
Hydrochloric Acid HCl + Water *(Muriatic Acid)*	Liquid	20° Be 31.45% HCl	Carboys Tank Cars Tank Trucks	Souring; removing hypochlorite bleach; dyeing.
Tetrasodium Pyrophosphate, Anhydrous $Na_4P_2O_7$ *(TSPP) (Pyro)*	White Powder	98% $Na_4P_2O_7$ (Equiv. 52% P_2O_5)	Bags	Stabilizing peroxide bleaches; water treatment and dispersing agent; detergent.
Sodium Metasilicate $Na_2SiO_3 \cdot 5H_2O$	White Granules	29.0% Na_2O	Bags Fibre Drums	Kier boiling as detergent.
Sodium Sulfide Na_2S + water	Red Chips or Solid Mass	60% Na_2S	Steel Drums	Dyeing with sulfur dyes; depilatory for wool pulling; desulfuring rayon.
Sodium Sulfite, Anhydrous Na_2SO_3 *(Sulfite)*	White Powder	98.5% Na_2SO_3	Bags Fibre Drums	Rayon manufacturing.
Sodium Bisulfite, Anhydrous $Na_2S_2O_5$ *(ABS) (Sodium Metabisulfite)*	White Powder	97.5% $Na_2S_2O_5$ (Equiv. 65.5% SO_2)	Fibre Drums	Bleaching wool; anti-chlor after bleaching with hypochlorite; rayon manufacturing.
Oxalic Acid $C_2H_2O_4 \cdot 2H_2O$	Colorless Crystals	99.5% $C_2H_2O_4 \cdot 2H_2O$	Fibre Drums	Bleaching; dyeing; for mordanting wool with chrome.
Ferric Sulfate $Fe_2(SO_4)_3$ + water *(Iron Copperas Nitrate)*	Liquid	47° Be 11% Fe	Carboys Barrels	Silk weighting; mordant.
Ferric Nitrate $Fe(NO_3)_3$ + water *(Iron True Nitrate)*	Liquid	43° Be 47° Be 10% Fe 11% Fe	Carboys Barrels	Silk weighting; mordant.

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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

Published every other Monday by
HOWES PUBLISHING COMPANY, INC.
One Madison Avenue, New York 10, N. Y.

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April 5, 1948

VOLUME 37 NUMBER 7

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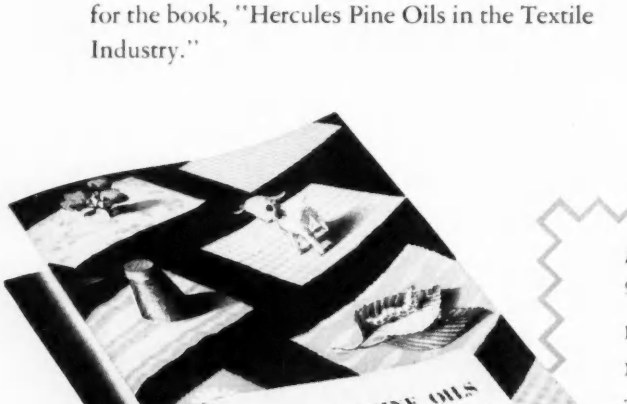

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Members should notify the Secretary immediately of all address changes

Questionnaire on Research

Final Tabulation Based on Returns Submitted by Sectional Advisory Research Committees

UNDER the auspices of the Executive Committee on Research, questionnaires on research were mailed last summer to all members of the Association.

The E.C.R. pointed out in an accompanying letter that in recent years the Association had expanded considerably the functions of the General Research Committee. This accelerated activity was made possible by the larger number of members who were contributing their services and ideas, as well as the increased salaried staff of research personnel.

Since there is a natural reluctance on the part of most members to offer their services or to make suggestions to established committees, and since there is no recognized method for making such contacts, the questionnaire was prepared.

The letter continued:

"This questionnaire has purposely been made all-inclusive in considerable detail as only by knowing the information requested and tabulating it can the purpose for which it is intended be served. This purpose is to produce for your administrative officers factual data as to the studies and problems the individual members desire the AATCC to undertake, with proper resulting benefit to not only the members but their respective employers. The answering of this questionnaire in a serious and careful manner will then permit the proper choice of individuals for functioning committees, taking into account willingness, facilities and knowledge. Hence the investigation, evaluation of results, and dissemination of the resultant conclusion will be greatly expedited.

"This is your Association; your officers, striving to serve you, can do so only by planning research which you as members desire. Only by having such pertinent information can the vast amount of dormant thoughts which you have in your mind both consciously and unconsciously be brought to light, crystallized, and developed."

The letter was signed by Dr. Louis A. Olney, Chairman of the Research Committee; Dr. Harold W. Stiegler, Director of Research, and J. Robert Bonnar, Chairman of the Executive Committee on Research.

The tabulation of returns follows:

I. GENERAL FIELD OF YOUR INTEREST AND PERSONAL ACTIVITY

A. 1. Textile Material	*Yarns*	*Woven Cloth*	*Knitted Fabric*	*Hosiery*	*Other*
Fibers					
a. Cotton	174	210	106	78	33
b. Synthetics	108	141	76	68	34
Viscose	131	142	101	75	33
Acetate	110	127	93	66	27
Others	27	105	61	68	33
c. Wool	114	132	71	77	27
d. Silk	53	81	62	63	26
e. Mixed	96	108	61	56	24
f. Others (Glass, Bast, etc.)	56	53	29	29	25
2. Preparation	135	159	86	72	42
3. Dyeing	173	195	107	102	39
4. Printing	60	114	54	32	23
5. Finishing	143	240	116	120	46
	1380	1807	1023	906	432

B. Laboratory		
1. Research and Development	Mill	213
	Chemical	228
2. Analytical		128
3. Testing	Mill	176
	Commercial	90
4. Dye Application	Mill	237
	Manufacture	54
5. Finishes	Mill	225
	Manufacture	102
6. Textile Chemicals and Specialties	Mill	225
	Manufacture	144
7. Consulting		61
8. Other		21

C. Mill		
1. Preparation	(Desizing	131
	(Scouring	174
	(Boil-off	155
	(Bleaching	174
	(Mercerizing	104
2. Dyeing		227
3. Printing		86
4. Finishing		268

D. Technical Service	
1. Dyes	168
2. Chemicals	189
3. Finishes	204
4. Auxiliaries and Specialties	191
5. Weaving	46
6. Preparation	97

II. PERSONAL DATA

	Testing Lab	*Plant*	*Research*	*Sales*	*Technical Sales Service*
1. Chemist	92	68	168	63	60
2. Technical	53	72	59	20	46
3. Production	33	98	29	9	7
4. Administrative	43	73	77	30	30
5. Salesman	14	1	2	24	35
	235	312	335	146	178

Research Problem Screening Meeting

THE Executive Committee on Research met at an all-day meeting with the chairmen of the Section Advisory Research Committees and eight research committee chairmen at the Downtown Athletic Club, New York, on February 26th. The following were present:

Executive Committee on Research

J. Robert Bonnar, *Chairman*
Dr. Miles A. Dahlen
Samuel A. Hayes
Henry F. Herrmann
Prof. Percival Theel

Sectional Advisory Research Committees

A. W. Etchells, *Representing Philadelphia Committee*
R. W. Jacobs, *Chairman Rhode Island Committee.*
D. X. Klein, *Chairman, Northern New England Committee*
C. B. Ordway, *Representing, Piedmont Committee*
Dr. E. W. K. Schwarz, *Chairman, New York Committee*
Dr. J. L. Taylor, *Chairman, Southeastern Committee*

Research Committee Chairmen

K. H. Barnard, *Non-Woven Fabrics; also representing Ageing of Textiles*
J. N. Dalton, *Fastness of Dyed Materials to Perspiration*
W. A. Holst, *Fastness to Light*
D. P. Knowland, *Small Color Differences*
Dr. J. E. Lynn, *Standard Methods of Determining Finishing Materials in Textiles*
F. A. Prisley, *Detergency*
C. A. Seibert, *Washing*

AATCC Staff

Dr. H. W. Stiegler, *Director of Research*
General Research Representatives
Dr. H. C. Chapin
C. W. Dorn
Dr. Jules Labarthe, Jr.

Purpose of Meeting

J. Robert Bonnar, presiding, stated that the purpose of the meeting was to propose and decide upon specific problems upon which the various sections felt research was needed, and on which they would be willing to work. He explained that the purpose of setting up a problem or problems to be undertaken by an individual section, under the guidance of its Sectional Advisory Research Committee, was that traveling conditions, and distance itself, make it difficult for widely separated groups to accomplish as much as a group working at close range.

The research committee chairmen were invited to attend the meeting inasmuch as they would present ideas from an overall association point of view. The Sectional Advisory Research Committee Chairmen, having conducted meetings to determine what their particular sections was interested in, would make recommendations, based on all suggestions, for work to be done in their section through the formation of a special committee for that purpose working under the guidance of the Sectional Advisory Research Committee. The meeting further offered an opportunity for the various sections to determine if other sections had similar projects in mind.

The large group was broken up into three smaller groups consisting of the: Sectional Advisory Research Committee Chairmen, Research Committee Chairmen, and Executive Committee on Research. These groups had individual meetings and reported to the large group on their recommendations and suggestions.

Suggestions

The Research Committee Chairmen divided their suggestions into four categories:

(1) Problems to be referred to the Executive Committee on Research for further consideration as a research problem.

(2) Problems for a new research committee.

(3) Problems as subjects for theses.

(4) Problems for Intersectional Contest Papers.

A number of suggestions, falling into each of the above categories, was given by this group.

This group also indicated that consideration should be given to the work of the following organizations, when a new project was considered, to ascertain if they are doing, or have done, work on the same project:

Textile Research Institute.
American Society for Testing Materials.
Society of the Plastics Industry.
Various Dyestuff Manufacturers.
Various Chemical Manufacturers.
Other Associations.

Various chairmen of the Sectional Advisory Committees presented reports concerning the subjects in which their sections had an interest and would be able to conduct research work. It was indicated that reports from the remaining sections would be available by March 20th. The Executive Committee on Research would consider all suggestions, decide on suitable projects, and report to the General Research Committee meeting on April 2nd.

Mr. Bonnar requested those present to consider not only those problems suggested by tabulation from the Questionnaire on Research but to consider all problems. He also requested them to advise the proper parties when they disagreed with test methods as it is the only way a committee may learn what is unsatisfactory.

Suggestions for other means of bringing about a closer relationship with the personnel of the various sections than through the Advisory Research Committees were requested but it was the consensus of opinion that all was being done that could be.

In addition to the various projects presented as possible research problems, other suggestions made at the meeting included: that certain types of work would lend themselves as subjects for school theses; that a research librarian be appointed to the staff at Lowell; that more information be published regarding the various committees and the work they are doing; that the Chairmen of the Sectional Advisory Research Committees explain some phase of the national activity to the local sections at their various meetings; that Intersectiontal Contest Committeemen be invited to meetings of the Sectional Advisory Research Committee; that committees make a thorough study of the literature before starting new work; that Sectional Advisory Research Committee Chairmen be advised by letter when new committees are formed so that they can submit any available information on the particular subject.

Report of the Publications Committee

THE Publication Committee has three main responsibilities: the publication of the Proceedings in the AMERICAN DYESTUFF REPORTER, the publication of the Year Book, and more recently the contemplated Monographs.

Proceedings

The proceedings have been published in the AMERICAN DYESTUFF REPORTER ever since the AATCC was organized twenty-six years ago. This method of publication having proved satisfactory, a new and somewhat broader contract between the Association and the Howes Publishing Co., was enacted during the past year.

During the earlier days of the Association there was no limitation whatever on the space available and practically every paper presented before National and Sectional Meetings was published in full.

The time has now arrived when it has been thought desirable to edit the Proceedings, possibly eliminating some papers entirely, and publishing others in a somewhat abstracted form. In order to carry out this new arrangement a Board of Editors has been organized to pass upon papers of questionable value, and edit other papers when thought desirable. Dr. H. C. Chapin, Secretary of the Association, is acting as Secretary of this Board of Editors the personnel of which is as follows:

John N. Dalton
Henry A. Rutherford
John H. Skinkle
Percival Theel
Howard M. Waddle.

From now on all papers presented at Annual Meetings, and Sectional Meetings and all other material for publication in the Proceedings should be sent directly to Dr. H. C. Chapin at the Lowell Textile Institute. All Research Committee Reports, for publication in the Proceedings should be cleared through Dr. H. W. Steigler's office and he will deliver them to Dr. Chapin.

Year Book

In accordance with the new contract with the Howes Publishing Co. an arrangement has been made whereby the Year Book will be delivered to the members by or before August 15th of each year.

It is believed that the new format of the Year Book will be approved by the members as well as the advertisers.

The AATCC Year Book has become one of the most important reference books for the Textile Industry. It not only goes to each member without charge, but is sold to non-members at an extremely low price.

We appreciate the cooperation of the advertisers, of whom there were 132 in the 1946 edition, they having made the volume possible. Without advertising the book would be prohibitive, as it is on a par in size and character with books selling for many more dollars. One item alone in the 1946 edition was ten tons of paper.

Monographs

Upon several occasions the Research Committee has published rather extended reports of certain research projects brought together in pamphlet form. Notable examples are those of Wool Carbonization, and another on the Study of Printing Pastes. It is suggested that this type of publication might be continued to advantage, in an extended and elaborated form under the general title of Monographs.

This constitutes a new project for the association, which at the present time is being studied by the Publications Committee. It contemplates the publication of a series of books each dealing with a definite subject, commonly known as monographs.

We have already arranged for No. 1 which will be a greatly enlarged and completely revised edition of the Analytical Methods for Textile Laboratories. This is being prepared under the editorship of Prof. Theel and his committee on this particular subject. It is hoped that this will be ready some time during 1948. The publication of this as far as the mechanical work of printing, binding, and distribution, will serve as something of a "guinea pig" for future procedure. So far only two further subjects have been suggested or at least given any serious consideration, they are—

Water Resistance of Textile Fabrics.

Vat Dyes (undoubtedly from the angles of Properties, Application and possibly composition).

This whole subject is of long range and will require much study and many conferences of the Publication Committee.

The first thought is, that this would be an excellent activity for the Association and would give us technical and scientific standing, but further and more serious consideration involves the following points.

1. If done at all they must be positively authentic.
2. They must be well written, and edited by capable persons.
3. They must contain an abundance of new material, and not a republication of old articles which have already appeared in the AMERICAN DYESTUFF REPORTER, or elsewhere.
4. They would require, as for example in the case of vat dyes, the cooperation of manufacturers, and also the users, and a willingness to divulge any new developments, unless seriously detrimental to the originators.
5. They could not be controlled by any one individual, or group, but should be a composite of many minds of broad experience, with accurate knowledge.

From the above list of considerations I believe it will be evident that the publication of monographs is bound to be a long range proposition, and cannot be satisfactorily pursued, unless sufficient time is taken to at least start out with a competent Board of Editors for each one, not only able but willing, to devote much time and effort over a considerable period of time.

In other words, the publication of a sketchy immature book and one open to criticism would do the Association much more harm than good.

By the time this Year Book is distributed we hope that progress may be reported.

Communications

The Publication Committee will welcome at any time the presentation of communications upon any subject which they believe will be of interest and value to the members of the Association.

Western New England Section

THE organizational meeting of the Western New England Section was held in the Hotel Garde in New Haven, Connecticut on Friday, February 27, 1948 at 7 p.m. With Dr. J. Edward Lynn, Temporary Secretary, presiding, the thirty-eight people present voted unanimously to continue the new section.

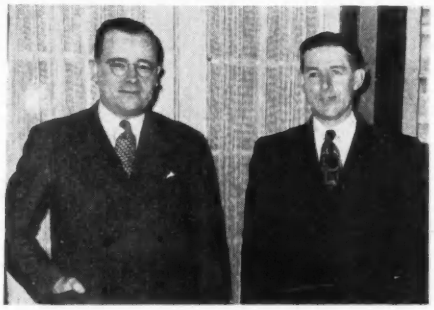
Two short talks were delivered by two past presidents of the AATCC, Wm. H. Cady and P. J. Wood, on the history and growth of the AATCC during which many valuable ideas and practices were suggested to the members of this section.

Dr. H. C. Chapin, Secretary of the National Organization, was also present to pledge his help to the new section.

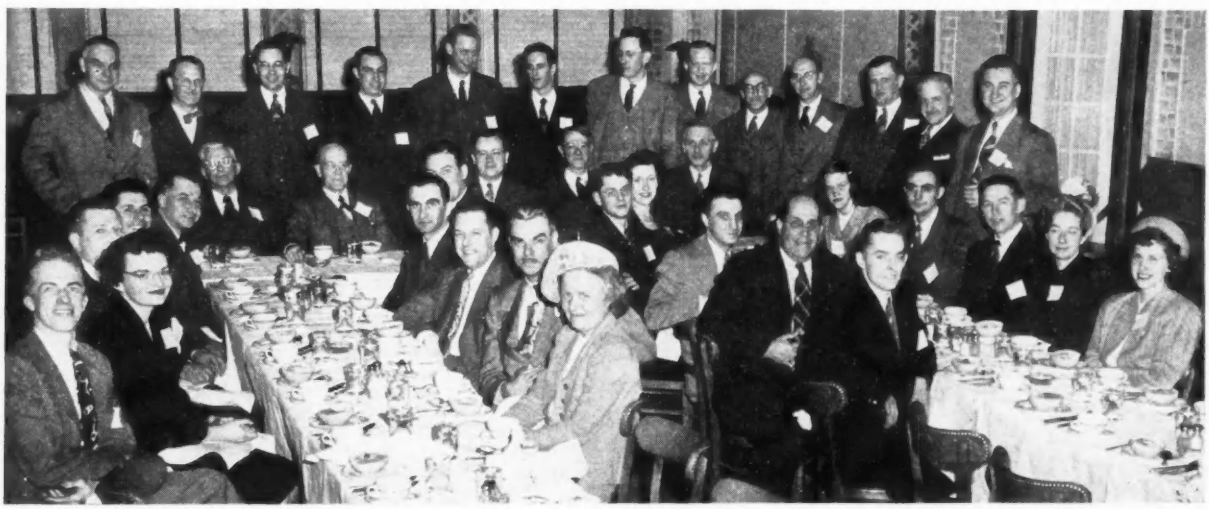
Dr. Lynn reviewed the answers received to the questionnaire relative to type of meals served, their cost, the type of papers to be delivered and the site most convenient for future meetings. New Haven, Hartford, and Bridgeport were the three cities most mentioned for meetings, with Friday as the most convenient day. Dyeing and resin finishing far outstripped any other topics for talks to be delivered at future meetings.

It was decided to hold another meeting on April 2nd with a technical speaker. Meanwhile, Dr. Lynn continued as Acting Chairman and Miss Eleanor L. McPhee Acting Secretary, until the meeting.

The total potential membership were



Dr. J. Edward Lynn, who was appointed Secretary Pro Tem by the National Council to proceed with the organization of the Western New England Section, and John M. Hood, a charter member of the national association, a charter member of the Northern New England Section, and who will also be a charter member of the Western New England Section.



AMONG THOSE PRESENT AT THE ORGANIZATIONAL MEETING OF THE WESTERN NEW ENGLAND SECTION

Standing at rear, left to right—Joseph F. Melody, Norwalk Hat Co., **F. Bryden,** Great Barrington, Mass., **W. C. Hill,** Monsanto Chemical Co., **George D. McTeague,** Smith Paper Co., Inc., **Norman A. Johnson,** American Dyestuff Reporter; **C. H. Allard,** Naugutuck Chemical Division, U. S. Rubber Co., **Robert N. Brownlee,** Naugutuck Chemical Division, U. S. Rubber Co., **Ernest L. Johnson,** American Felt Co., **O. Edelstein,** Pond Lily Co., **John B. Dick,** Pond Lily Co., **John E. Hirn,** National Aniline Division, Allied Chemical & Dye Corp., **Myron D. Reeser,** American Dyestuff Reporter, **Edward A. Schuman,** American Cyanamid Co.

Seated at rear table, left to right—Dr. Harold C. Chapin, National Secretary, AATCC, **William H. Cady,** Past President, AATCC, U. S. Finishing Co., **Dr. J. Edward Lynn,** American Cyanamid Co., **P. J. Wood,** Past President, AATCC, Royce Chemical Co., **Harold H. Taylor,** Sidney Blumenthal & Co., Inc.

Seated at left hand table, clockwise—Edmund S. Lamont, Monsanto Chemical Co., **Miss Eleanor L. McPhee,** American Cyanamid Co., **C. F. Schilkowsky,** Sidney Blumenthal & Co., Inc., **J. Boyko,** Sidney Blumenthal & Co., Inc., **Royce W. McGaughey,** Tingue Mills, Inc., **J. Dean,** Tingue Mills, Inc., **Socrates V. Vaniotis,** Sidney Blumenthal & Co., Inc., **Frank Peterson,** Sidney Blumenthal & Co., Inc., **Raymond J. Carey,** General Dyestuff Corp., **Dr. Martha Johnson,** General Electric Co.

Seated at right hand table, clockwise—M. R. Burnell, American Cyanamid Co., **N. J. Glade,** American Cyanamid Co., **E. J. Troianello,** American Cyanamid Co., **Dr. Edward A. Murray,** Deering-Milliken Research Trust, **Miss Alice Balfrey,** Deering-Milliken Research Trust, **Miss A. A. Hunter,** Deering-Milliken Research Trust, **A. M. Stamm,** Deering-Milliken Research Trust, **John M. Hood,** American Cyanamid Co., **Mrs. G. F. Adams,** General Electric Co., **Miss T. Corn,** General Electric Co.

Present, but not in photograph—Fred T. Simon, Sidney Blumenthal & Co., Inc., **W. J. Barnes,** Sidney Blumenthal & Co., Inc.

SPEAKERS AT THE ORGANIZATIONAL MEETING OF THE WESTERN NEW ENGLAND SECTION: William H. Cady, Past President, Dr. Harold C. Chapin, National Secretary, and P. J. Wood, Past President.

circularized by mail asking for nominations for the nine elected officers in the section. Balloting took place at the next meeting. Only such people as signified affiliation could nominate. In addition the name of any nominee who did not wish to affiliate or did not answer was dropped.

A list of the total potential members of this section was sent to each.

There was considerable enthusiasm for this new section which it was felt will become a successful segment of the AATCC.

Respectfully submitted,
Eleanor L. McPhee.

—♦ ♦—

Meeting, LTI Student Chapter

THe regular monthly meeting of the Lowell Textile Institute Student Chapter was held on March 2 with Vice-Chairman Peter J. McKone presiding.

The Program Committee announced the technical program for the joint meeting of the Northern New England Section and the Student Chapter, to be held in Lowell on April 16.

6:00 P.M.—Open forum discussion. The topic is "Should Co-operative Education be Developed at Lowell Textile Institute in Such a Manner that Actual Industrial Experience be a Requirement for Graduation?" Two teams have been selected from the student membership.

Affirmative

Therese R. Commerford '50
Robert E. Morrison '50
Robert J. Pierent '49

Negative

Joan L. Gregg '50
Herbert Lachut '49
Lawrence McMahon '49

6:45 P.M.—Dinner.

7:45 P.M.—Technical Papers. These include:

"Photographic Aids to the Textile Industry"—Melvin Siegel '48.

"A New Method of Evaluating Water Resistance of Textiles"—Professor John H. Skinkle.

"Fire and Textiles"—Allen Frank '48 and Stephen Ruffenach '50.

Members of the Student Chapter recently enjoyed two industrial trips. On February 6 a group of forty visited the Physical and Chemical Research Laboratories of the Pacific Mills, Worsted Division at Lawrence, Mass. The tour through the laboratories was very interesting and enlightening, thanks to Frank J. O'Neil and his co-workers.

On March 6, a smaller group visited the Lawrence plant of the Champion International Paper Company. Norman Bearse, Technical Director, conducted the tour through the complete manufacturing process from wood chips to the finished product, and also through the auxiliary plants. The success of these two trips has prompted the Program Committee to make arrangements for trips to other industrial plants.

The next program in the seminar series was scheduled for March 30, when Dr. Reginald Wakeman of Onyx Oil Company spoke on "Surface Active Agents."

Respectfully submitted,
Lawrence C. Gardner *Secretary.*

—♦ ♦—

Meeting, Mid-West Section

THE second winter meeting of the Mid-West Section was held at the Bismarck Hotel, Chicago, Illinois, February 28, 1948.

The afternoon meeting was called to order by the Vice-Chairman at 2:30 P.M. 120 members and guests were present. Arthur Barker introduced C. H. A. Schmitt of the Sandoz Chemical Works, Inc., who directed and commented upon the showing of their colored sound movie entitled: "Metachrome Dyeing with Metomega Chrome Colors." This was most interesting and well received, as evidenced by the number who, at the close of the meeting, inspected the interesting display of fabrics and materials.

The meeting was then opened to a general discussion of possible activities for future afternoon meetings, including such suggestions as movies, short papers prepared by various members, or breaking up the attendance into several small discussion groups. Upon receiving no response from the floor, the Vice-Chairman requested members to contact the officers, making their suggestions individually. The meeting was adjourned at 3:30 P.M.

Dinner was served at 7:00 P.M. with 114 members and guests present.

The minutes of the last meeting and the treasurer's report were read and accepted.

The following committees were appointed:

Registration

Alfred J. Olson—*Chairman*
David A. Anderson
Harold W. Doyle
Paul Soderdahl

Membership

Archie G. Alexander—*Chairman*
George B. Chabot
James S. Morrison
John Nerl
J. Gordon Stott

Outing

Maxwell Boyce—*Chairman*
Andrew F. Blackburn
Norman G. Koehler
James G. Morgan

Corporate Membership

Eric W. Camp—*Chairman*
Gilbert T. Latham
Edward J. Siegrist

Technical

Leonard J. Armstrong—*Chairman*
(This chairman will appoint his own committee).

Our speaker of the evening was then introduced by the Chairman. Leonard Shapiro, research director of the Alrose Chemical Company, gave a very interesting talk on the subject of "Wool Shrinkage Control". Several illustrative slides supplemented his talk. Much interest in Mr. Shapiro's subject was evidenced by the large number of questions asked by the members, and the interest shown in the exhibits on display after the close of the meeting.

The meeting was adjourned at 9:20 P.M.

Respectfully submitted,
William Boyd, *Secretary.*

Intersectional Contest ☆Third Prize Winner☆

Dyeing and Fastness Characteristics of Aqueous-Chlorinated Wool*

Presented by the
NEW YORK SECTION

Abstract

An 80-yard cut of an 8.25-ounce flannel containing a worsted warp of 100% Australian and a filling of 90% Australian and 10% domestic noils was divided into six parts. One portion of this fabric was left untreated for reference purposes, whereas the remaining portions were chlorinated using representative aqueous chlorination methods. Three of these methods were acid chlorinations and two were alkaline chlorinations.

The six fabrics were examined for (a) shrinkage control, (b) alkali solubility, and (c) fiber damage as indicated by staining and microscopic examination. The results are interesting and, while they show the difficulties encountered in controlling aqueous chlorination processes, direct correlation of the data was impossible.

The six fabrics were dyed with representative and well known acid, milling, metallized, chrome (top and metachrome), soluble vat and vat dyes. It was shown that the rate of dyeing, as measured in the Dyeometer, as well as in pot dyeing, was influenced by the treatment. Generally speaking, when the acid, milling, metallized, chrome and soluble vat dyes were used, the rate of dyeing during the initial stages was faster on those fabrics treated by the acid chlorination methods and slower on those fabrics treated by the alkaline chlorination methods. When vats were used no data on the rate of dyeing were accumulated, but heavier dyeings were obtained with those fabrics having the highest alkali solubility.

The shade and strength of the final dyeing was influenced to some extent by the various treatments, but no correlation among the various treatments and the shade and strength obtained appears possible.

The light fastness of the dyes used in this study was not affected by any of the treatments.

The treatments did, however, influence the wash fastness of the dyes used in this investigation. This influence was more pronounced with the acid and milling dyes. The wash fastness of the metallized dyes was only slightly influenced by the treatment, whereas the wash fastness of the chrome, soluble vats and vats was not noticeably affected. Generally speaking, the acid-chlorinated pieces showed poorer wash fastness. This was especially true with those fabrics with high alkali solubility. On the other hand, the wash fastness of those fabrics treated by the alkaline chlorination processes was in most cases as good as, and in some cases superior to, the wash fastness of the untreated fabric.

Introduction

CHLORINATION of wool is by no means a novel process. In a few months it will be exactly 100 years since that unexcelled genius of textile finishing, John Mercer *(1)*, the calico printer, invented it, creating the counterpart of the finishing process of cotton which bears his name. As with mercerization, it took several decades before this new chemical modification of wool fibers found due appreciation, and as with mercerization, only after it had been applied for a purpose other than that for which it was originally proposed. Mercer suggested the chlorination of wool for the purpose of enhancing the ability of the fibers to take up dyes in printing. The diminished tendency of the chlorinated wool fabrics to shrink was only later observed. While exact data is lacking, it seems that the anti-felting treatment of wool by chlorination was widely used in Great Britain in the period following the First World War. It was only during the Second World War, however, that it found large-scale application in this country in the treatment of socks for our armed forces.

Before describing our work we give a brief summary of the dyeing behavior of chlorinated wool as described in the literature.

As stated above, according to Mercer, chlorinated wool exhibits increased ability to take up dyes. Adams *(2)* found, however, no difference in the take-up by chlorinated and unchlorinated wool of the characteristic acid dyes, Orange II and Lake Scarlet R, after dyeing for 45 minutes at the boil. He explained the greater brilliance of the chlorinated wool by the increased glossiness. Trotman, Bell and Saunders *(3)* showed that the difference between the behavior of untreated and chlorinated wool is in the rate of dyeing, rather than in the equilibrium finally obtained, chlorinated wool dyeing much more rapidly than unchlorinated wool. This conclusion appears justified in the light of some of the later investigations which showed that the rate of dyeing was profoundly changed by the chlorination, whereas the affinity for the dyes was affected only to a minor extent. Consequently, chlorinated wool dyed quite differently from untreated wool under these conditions where the rate with the latter was low; the difference was minimal when

* Presented at Intersectional Contest, National Convention, Chicago, October 24, 1947.

Committee

Daniel P. Knowland, *Chairman*
William F. Brommelsiek
Dr. Hugo Ehrhardt
James E. Flint
Edward D. Lind
Charles H. A. Schmitt
Dr. Emery I. Valko
Dr. Arthur E. Weber
Dr. Alfred L. Peiker, *Speaker*

the rate of dyeing of normal wool was high. The most recent investigations by Lemin and Vickerstaff *(4)* have shown that at 60° C. the rate of dyeing chlorinated wool with the acid dye, Naphthalene Orange G, was almost twice as high as that of normal wool, while the affinity of this dye for the chlorinated wool was not substantially higher than for the normal wool. In other words, the equilibrium reached was practically identical for both types of wool. Tone-in-tone dyeing effects may be produced simply by using mixtures of ordinary wool and chlorinated wool and dyeing with chrome, acid, milling or direct cotton dyes, since these dyes are taken up slowly by ordinary wool. The contrast is more pronounced at low dyeing temperatures. At room temperature even the ordinary acid dyes show a very large difference. According to Townend *(5)* the contrast can also be increased by using a retarding agent. Excellent contrast can be produced by this method with certain level-dyeing acid dyes even at 60° C. Dyes with one sulfonic group produce little difference, while those with two sulfonic groups show a greater degree and those with more than two sulfonic groups, the best degrees of contrast. As Townend and Simpson *(6)* showed, the increased contrast obtained with dyes possessing the higher number of sulfonic groups is due to the decreased rate of dyeing of normal wool.

Lemin and Vickerstaff also found that the titration curves of wool with acids is somewhat changed by chlorination. Although the isoelectric point and the maximum acid-binding capacity are substantially unaltered, chlorinated wool binds more acid than untreated wool at medium pH values.

This behavior agrees with the statement of Bird *(7)* that chlorinated wool requires less acid in the dyebath than normal wool. According to Bird, afterchrome dyes may be applied to chlorinated wool by the metachrome method, while the chrome-complex dyes may be applied from a neutral or weakly acid bath. Mooradian and Millson *(8)* found likewise that wool, when subjected to chlorination, generally requires less acid to obtain dyeings of equivalent color value and levelness.

Since high rate of absorption is usually associated with high rate of desorption, the fastness of dyeings of chlorinated wool against wet processing is expected to be diminished; and this has been generally observed.

If chlorinated wool dyes differently from untreated wool, unevenness of chlorination must lead to uneven dyeing. Chlorine exhibits an extremely high affinity for, and a high rate of reaction with, wool. If no special precautions are taken, uneven chlorination of the fabric cannot be avoided.

Logically, only dyes with good fastness to wet treatment should be applied to those woolen fabrics whose tendency to shrink in laundering has been reduced. Since, according to the literature, the fastness of acid dyes is even lower on chlorinated wool than on ordinary wool, these would be unsuitable for non-felting fabrics. On the other hand, the dyes which are more resistant to wet treatment, viz., chrome dyes, milling dyes, etc., reflect the unevenness of chlorination.

Only little need be said here about the theories regarding the influence of chlorination on the dyeing behavior of wool fabrics. The increased ability of the chlorinated fibers to absorb dye, or more exactly, their increased dyeing rate, is generally attributed to the damage of the epithelial cells. This view is supported by the observation that the mechanical removal of these cells by abrasion brings about a similar change in the dyeing behavior. There is a possibility, however, that the changed behavior is due, to a certain extent, to purely chemical changes in the fiber, such as oxidation of sulfhydril groups, the splitting of the amide linkages or increased swellability of the fibers. The choice between these possibilities is most difficult since these chemical changes are somewhat related to the damage of the epithelial cells.

Mention should be made of the technology for examining chlorinated wool by staining it with Kiton Red G, introduced by Trotman, Bell and Saunders *(3)*. They found that when chlorinated wool is dyed in the cold with this dye and then examined microscopically, three different depths of color are observed. The fibers, which are devoid of epithelial cells seem to be dyed deeply, others in which the epithelial cells are somewhat transparent are dyed lightly and still other fibers are unstained. The method has been recently perfected by Carter and Consden *(9)*.

Methods of Treating Fabrics and Their Evaluation

Methods of Treatment

The fabric used in this investigation had the following specifications:—

Warp: 1/27 worsted yarn 100% Australian.

Filling: 4¾ run 90% Australian, 10% Domestic Noils.

Weight: 8¼ ounces per yard.

Width: 54-55 in.

Approximately 80 yards of this fabric was divided into six parts. One portion was used untreated and will be hereafter referred to as Fabric "A". From the numerous aqueous chlorination methods proposed for controlling shrinkage, five representative processes were selected to treat the remaining portions.

About 20 yards were treated according to the principles of G. Wiegand, U. S. P. 2,144,824 *(19)*. Wiegand showed that the acid chlorination of wool can be controlled when buffers such as ammonia or compounds which include one or more amino or imino groups, or imino carboxylic acids, carboxylic amides, urethanes, urea, dicyandiamide or substitution products of these compounds are introduced into the bath. The fabric treated according to the procedure which follows, will hereafter be called Fabric "B".

4,500 grams of fabric was chlorinated in an experimental stainless steel dyeing machine in a bath of the following composition:

Water	135 liters
Sodium hypochlorite (9.8% active Cl_2)	1 liter
Sulfuric acid (98%)	720 grams
Glycin	45 grams

The fabric was wetted out in the solution containing water, sulfuric acid and glycin at room temperature. Then the sodium hypochlorite solution diluted 1:1 with water, was added to the bath over a period of 30 minutes. After this, the fabric was run in the bath for another 30 minutes. The fabric was rinsed in water for 15 minutes, dechlorinated in a bath containing 45 grams of sodium bisulfite, rinsed for 10 minutes and then allowed to stand in water overnight. The fabric was then hydroextrated and dried.

In order to insure more complete and uniform chlorination the preceding process was repeated. At the end of the second treatment the chlorinated flannel was neutralized by immersing in a bath containing 135 grams of sodium carbonate.

Fabric "C" was treated according to the teachings of Stevenson and Raynes, U. S. P. 2,429,082 *(20)*. The process was as follows:—

4,600 grams of fabric was treated in a cold bath at a liquor ratio of 1:25. The bath contained:

Calcium chloride	460 grams
Peregal O	92 grams
Potassium permanganate	92 grams
Sodium hypochlorite	138 grams (available Cl_2)

The fabric was treated in this bath for 40 minutes, rinsed in water for 15 minutes and then immersed in a bath containing the following ingredients:

Sodium bisulfite	276 grams
Sulfuric acid (98%)	230 grams

The fabric was then rinsed and neutralized in a bath containing:

Ammonium hydroxide (26° Bé) ..... 92 grams
Sodium pyrophosphate .....138 grams

After a thorough rinsing the flannel was hydroextracted and dried.

The fourth portion of the flannel was treated by the acid chlorination method developed by the Botany Mills of Passaic, N. J. This portion will be known as Fabric "D."

Fabric "E" was treated according to the method of Kamlet, *et al* (U. S. P. 2,427,097 *(21)*. A typical formula used to treat 100 kilograms of wool in a bath ratio of 1:25 follows:

Alrochlor BH (30% sodium sulfamate) ..... 36 kilo
Sodium hypochlorite ..... 5 kilo (available Cl_2)
Wetting agent ..... 0.5 kilo
Formaldehyde ..... 5.0 kilo
Sulfuric Acid (98%).....18.5 kilo

The details of rinsing, antichlor and neutralizing are not known.

Fabric "F" was treated according to the alkaline chlorination method developed by the Alrose Chemical Company. After a pretreatment the fabric was chlorinated using 3% available chlorine, rinsed, treated with an antichlor and neutralized. This was followed by a bleach in one volume hydrogen peroxide for one hour at room temperature.

Evaluation of Fabrics

The fabrics used in this study were examined to ascertain the effectiveness of the various treatments for controlling shrinkage. In addition, the fabrics were studied to determine how these treatments modified or changed the chemical and physical properties of the fibers.

The following tests were applied to each of the test fabrics:—

1. Determination of alkali solubility.
2. Determination of the pH of the aqueous extract.
3. Determination of evenness of treatment by staining.
4. Hardy and Plitt procedure for microscopic examination.
5. Determination of shrinkage control by laundering.

1. Alkali Solubility

In order to insure representative sampling of each piece of fabric and to obtain a measure of the variability of the treatment, test samples weighing approximately three grams were cut at random over the entire piece. About two grams of these test samples was cut into smaller pieces, approximately 9 cm^2, and dried to constant weight at 105-110°. W_1 = total weight of the dried pieces.

The small pieces were immersed in 200 ml. of 0.1N KOH maintained at 65° ± 0.1° C. in a thermostat. The samples were stirred occasionally for a period of one hour after which they were filtered with suction through a tared, coarse, fritted glass crucible, rinsed thoroughly with distilled water, allowed to stand in a 1% acetic acid solution for 5 minutes and again rinsed with distilled water. The residue was dried in the crucible to a constant weight at 105-110° C. and its weight W_2 determined. The per cent solubility, S, was calculated as follows:—

$$S = \frac{W_1 - W_2 \times 100}{W_1}$$

The results are given in Table No. 1.

Table I—Alkali-Solubility

Fabric:	*A*	*B*	*C*	*D*	*E*	*F*
Values:	15.6	49.5	20.5	22.5	58.4	30.9
	16.3	47.9	14.0	23.6	56.8	29.8
	17.0	47.0	20.1	13.8	41.3	28.5
	16.3	55.9	17.9	18.5	51.4	45.1
	16.5	47.5	22.1	28.0	37.9	31.9
	18.6	48.3	27.4	24.7	36.4	
	15.8	—	23.2	26.2	49.6	—
	15.1	—	23.5	25.2	56.5	—
	16.4	—	22.9	23.6	—	—
	16.1	—	22.1	25.3	—	—
Average	16.4	49.3	21.4	23.1	48.5	33.1
Deviation	0.5	3.4	3.5	4.1	8.9	6.7

The results given in the table indicate that (a) the method used gave reproducible results, (b) the untreated fabric was uniform, (c) most of the fabrics were not too uniformly treated with Fabrics "B", "C" and "D" showing the same order of variability, (d) Fabric "F" showed considerable variation, but attention should be paid to the fact that only five determinations were run, (e) Fabric "E" showed a high degree of variability.

The variability of alkali solubility is a good indication of uneven damage due to the treatment. This was made visible by dyeing Fabric "E", which showed a high variability, according to the following formula and procedure:

0.100% Fast Light Yellow GGXN Conc. (C. I. 639).
0.083% Palatine Fast Pink BNA High Conc. (Pr. 326).
0.300% Alizarine Astrol B (C. I. 1075).
10% Glauber's salt.
3% Acetic acid 28%.

Start at 185° F., raise to the boil in 15 minutes and boil 15 minutes.

The above procedure was previously *(10)* found to show particularly distinct shades on undamaged and light-damaged wool, i.e. tippy wool. Fabric "E", when dyed with this procedure, exhibited reddish and bluish blotches. The red and blue portions were mechanically separated and the alkali solubility of each portion was determined. The alkali solubility of the red portion was 53.1% whereas the solubility of the blue portion was 32.1%. The average solubility was 42.6%. The results indicate that chlorination has an effect on the behavior of wool to this test similar to the damage caused by exposure to sunlight.

2. pH Value of Aqueous Extract

The values given in Table II were determined as follows:—

A 25-cm^2 sample was boiled in 150 ml. of distilled water for 3 minutes and after cooling to 25° C. the pH of the solution was determined by the Beckman pH meter.

Table II

Fabric	*pH Value*
"A"	7.4
"B"	6.5
"C"	5.3
"D"	6.2
"E"	7.6
"F"	7.1

3. Fiber Staining Tests

Several staining techniques were tried, including that advocated by Carter and Consden *(9)*, but the one that gave the most striking results was performed as follows:

Pieces of the six fabrics were wet out, rinsed and then stained in a solution containing:

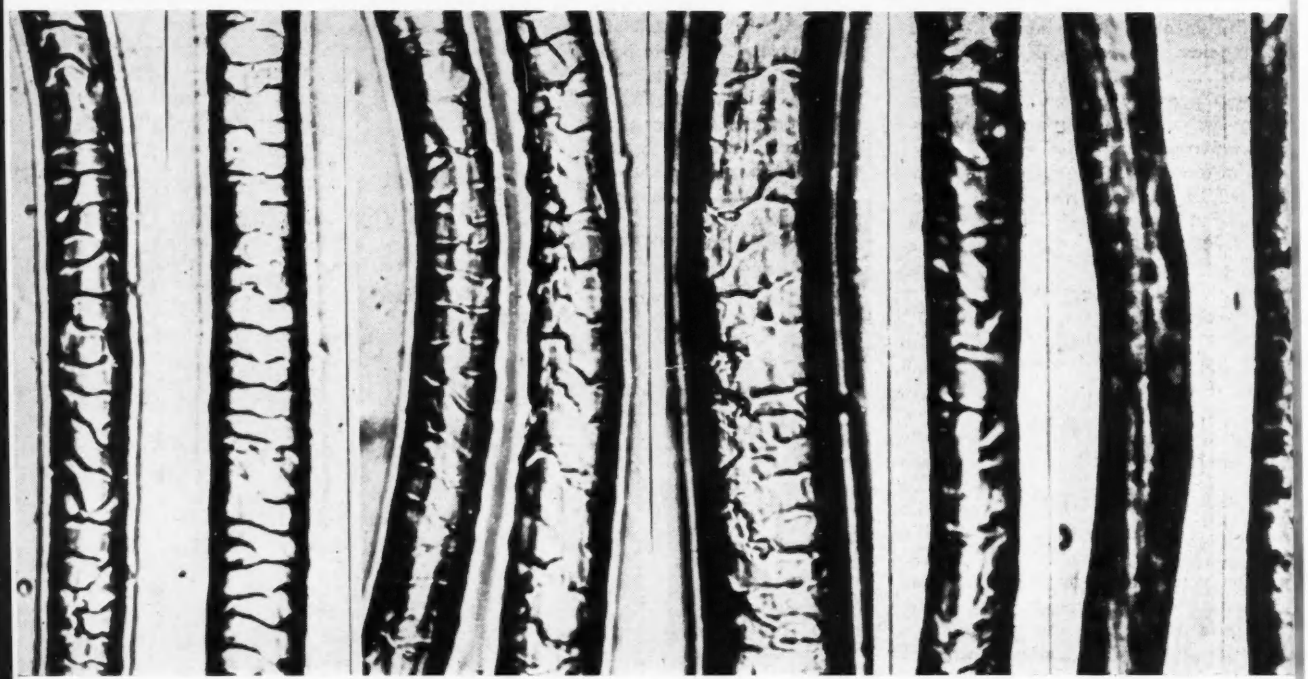
0.125% Helvetia Blue (C. I. 706).
0.2% Tannic acid (U.S.P.)
0.2% Picric acid.

The samples were immersed for 30 seconds in the bath at a liquor ratio of 100:1 at 70° C., rinsed and then dried. The various pieces were stained as follows: :

Fabric "A"—Stained evenly a light yellow green.
Fabric "B"—Stained very unevenly; the staining varied from a light yellow green to a deep bluish green.
Fabric "C"—Stained unevenly a very light yellow green.
Fabric "D"—Stained quite evenly; the surface fibers were stained a deep forest green, whereas the centers of the yarns were stained a light yellow-green.
Fabric "E"—Very uneven staining; the color was a yellow-green slightly bluer than that shown by Fabric "A".
Fabric "F"—Evenly stained a shade similar to that shown by Fabric "E" but slightly heavier.

4. Microscopic Analysis

The method employed was a modification of the Hardy and Plitt procedure



1 2 3 4

Photograph 1

(11). The procedure used here consisted in hand cleaning the selected fibers with ether and inserting these in a press wherein two ⅛" pressboards were lined with Koda plastic film No. 200 of .002" thickness. The fibers were placed between these sheets and the assembly inserted in a special U-type clamp. The pressure screws were tightened to embed the fibers in the plastic film. The clamp was then placed in an oven at 95° C. for 15 minutes in order to soften the plastic sheet and thus insure proper embedding of the fibers. Upon removal from the oven, the clamp was opened and the fibers removed from the cooled plastic film by means of a soft brush. The cast of the fiber surface was thus made on both the upper and lower plastic films. These films were then mounted face down on a microscope slide and held in position with Scotch tape. The positive impression of the scale structure was then examined by means of a microscope.

It was found that representative specimens from the treated fabrics could not be selected without arbitrariness. This difficulty is apparent when considering the construction of the fabric and the wools contained therein. The woolen filling contains wool and noils. These noils are short, fine fibers that probably are mechanically damaged. The changes produced by the chlorination treatments would be expected to be greater on such fibers than on staple wool.

When examined microscopically the warp in each instance disclosed less damage than the filling which is in agreement with the expectation. In addition, the shrinkage control tests showed lesser control in the warp direction.

The photomicrographs shown in Photograph I exemplify the degree of damage that fibers may undergo through aqueous chlorination. The various degrees of damage shown here are to be found in all of the treated fabrics and thus no one fabric can be termed more or less damaged than the others by the results of these tests. The fibers designated as 1 show no scale damage from natural or manufacturing sources and are similar to undamaged virgin fibers. The fibers marked 2 show the introduction of the fiber shrinking phenomenon with the development of striations similar to the epidermis damage noticed on over-scoured fibers. The damage as shown by the specimens labeled 3 and manifested by the furthering of striations with some scale structure disappearance is comparable to the damage caused by sunlight and/or alkali. The fibers marked 4 represent the ultimate damage which occurs; all scales having been removed, the fibers are susceptible to further damage and would disintegrate during laundering. This is similar to damage caused by over-bleaching.

5. Shrinkage Control—Laundering Tests

The six fabrics were tested for shrinkage control by several methods of washing. The results were not consistent from method to method. For this record the results obtained when the tentative AATCC procedure *(12)* was employed will be described in detail. A brief discussion of the other methods used will be given in the discussion of the results.

Since the quantity of material was limited, test pieces smaller than those specified for the tentative procedure were used. The use of the smaller pieces probably affected the accuracy of the results, i.e. the percentage figures given in Table III are only approximate. It is felt that larger pieces would not change the order of magnitude. The percent shrinkage was determined after 1 and 3 washes.

As the test fabrics became available, small pieces 8 inches square were cut at random and subjected to washing. The results, Series 1, Table No. III, obtained for Fabrics "B", "C", and "D" were disappointing in that Fabric "D" was the only fabric to show any control and this fabric was good only in the filling.

Since the tests described in the preceding paragraph were run on the fabrics

Table III—Shrinkage Control Tests

	No. Wash	Cloth "A" % Shrinkage Warp	Cloth "A" % Shrinkage Fill	Cloth "B" % Shrinkage Warp	Cloth "B" % Shrinkage Fill	Cloth "C" % Shrinkage Warp	Cloth "C" % Shrinkage Fill	Cloth "D" % Shrinkage Warp	Cloth "D" % Shrinkage Fill	Cloth "E" % Shrinkage Warp	Cloth "E" % Shrinkage Fill	Cloth "F" % Shrinkage Warp	Cloth "F" % Shrinkage Fill
Series 1	1	24	9	34 34 22	16 20 10	32	7	8	2	—	—	—	—
Blank	3	42	16	45 43 42	22 30 18	38	6	20	2	—	—	—	—
Series 2	1	7	7	12	10	14	4	2	0	35	19	8	5
Acid Dyeing Procedure	3	40	14	40	15	22	3	12	2	41	24	22	8
Series 3	1	6	2	8 14	5 3	1	2	2	0	41	11	15	1
Calcocid Phloxine 2G	3	36	12	36 38	16 20	20	16	12	2	50	15	30	3
Series 4	1	6	7	8 14	6 7	11	0	0	0	33	6	20	0
Top Chrome Calcochrome Brilliant Blue BBG	3	38	12	36 38	12 20	18	2	12	0	47	13	35	3
Series 5 Calcofast Wool Yellow N	1	10	6	10 16	8 9	8	4	0	0	34	25	21	2
	3	40	16	42 40	16 20	38	7	12	0	41	27	30	1
Series 6	1	25	8	31	8	10	0.5	4	0	—	—	—	—
Vat Red Violet RH	3	41	15	42	13	15	1	20	0	—	—	—	—

as they were received, the question was asked, "How will normal dyeing procedures influence the resistance to shrinkage?" In order to answer this question, test pieces were cut from the various fabrics and treated prior to washing as follows:

Series 2—Pieces of the six fabrics were treated in a bath containing 10% Glaubers salt and 3% sulfuric acid (98%) at a liquor ratio of 1:60. The swatches were entered into the bath at 120° F., the bath raised to the boil in 30 minutes and kept at the boil for 60 minutes.

Series 3—Test pieces of the six fabrics were dyed using the procedure described under Series 2 with the addition of 1% Calcocid Phloxine 2G (C. I. 31).

Series 4—Dyeings were made by the top chrome method on swatches of the six fabrics using 1% Calcochrome Brilliant Blue BBG (C. I. 720). The procedure in outline follows:

10% Glauber's salt.
2% Acetic acid (28%)—boil 30 minutes, add
2% Acetic acid (28%)—boil 15 minutes, add
0.5% Sodium bichromate—boil 45 minutes, rinse.

Series 5—1% Calcofast Wool Yellow N (Pr. 331) was dyed on pieces of the six fabrics using the following procedure:

To a dyebath at 1:60 liquor ratio containing 3% sulfuric acid (98%), the swatches were entered at 120° F., the dyebath was brought to the boil in 40 minutes, 3% sulfuric acid (98%) was added and the dyeing was continued at the boil for 1.5 hours.

Series 6—Swatches from Fabrics "A", "B", "C" and "D" which had been dyed with 3% Vat Red Violet RH (C. I. 1212) by the procedure described later in this paper, were included in these tests.

The results of the shrinkage control tests as determined by the AATCC tentative procedure are given in Table No. III.

Discussion of Fabric Evaluation

The alkali solubility values indicate that, while the degree of variability in the test method is of the order of 1%, the treated samples exhibited a greater degree of variability. The greater variability in the treated samples is undoubtedly due to the unevenness of the chlorination treatments. The average results, however, are in line with those obtained by Harris and Smith *(13)*.

Cross sections made from threads taken from each piece and stained with Helvetia Blue indicate that in Fabrics "A", "B", "C", "E" and "F" the fibers are partially ring-dyed. Fibers from Fabric "D" were deeply ring-dyed with a crescent penetration appearing in some fibers.

Results of the determination of resistance to shrinkage as obtained by the AATCC tentative procedure demonstrate the difficulty in obtaining uniformly nonfelting fabrics by wet chlorination procedures. This difficulty is due to a large extent to the rapidity of the reaction of chlorine with wool leading to unevenness of chlorination. (See Table IV.) In addition, this unevenness was enhanced by the character of the fabric employed in this investigation. In this connection it is noteworthy that, as Phillips *(14)* stated, when 5% of untreated wool is blended with 95% of chlorinated wool the blend will felt.

The conditions under which the pieces were tested for shrinkage may have also partly contributed to the adverse results obtained. It is known that wool treated by certain methods of shrinkage control is susceptible to acid and may even be acid fulled. Fabrics treated by these methods may lose their shrinkage resistance if subjected to an acid dyeing procedure. In order to evaluate some of these fabrics for resistance to felting and shrinkage by much less drastic wash procedures, it was shown that Fabric "C", "D", and "F" would stand considerable hand washing, even in the presence of soda ash and soap. Many of these fabrics also did exhibit good resistance to shrinkage when they were placed in a home washing machine, providing the machine was not heavily loaded.

The rapidity of the take-up of chlorine and its dependence on the pH is shown in Table IV.

Influence of the Treated Fabrics on the Dyeing Rates and Fastness Properties

This investigation is not concerned with producing woolen materials with controlled shrinkage. Thus, while the fabrics available for these studies do not represent materials that exhibit a high degree of resistance to shrinkage, they do represent test pieces wherein the wool has highly differing chemical and physical properties as a result of typical antishrink treatments.

The literature contains many references to the dyeing properties of chlorinated wool; most of these are very general, some are contradictory and many are as-

Table IV—Experiments on Rate of Chlorination
For 90% Chlorine Pick-Up

Initial pH	*Time Required*	*pH*	*Yellowness as Compared to the Original*
2.0	1 minute	1.6	Slightly whiter
3.0	1 minute	2.1	Slightly whiter
4.0	1 minute	2.3	Slightly whiter
5.0	1 minute	2.3	Slightly whiter
6.0	1 minute	2.3	Slightly whiter
7.0	2 minutes	3.6	Much Yellower
8.0	20 minutes	6.9	Very much yellower

Volume 50:1
3.5% Chlorine (on weight of wool)
18.3°C. ±1°C.
pH adjusted with hydrochloric acid
Australian wool yarn

sociated with some particular type of treatment. It is the purpose of this investigation to demonstrate how the various treatments described in the preceding paragraphs influence the dyeing rates and fastness properties of representative acid, milling, metallized, chrome, soluble vat and vat dyes. In studying the results it must be borne in mind as Crossdale *(15)* has so aptly put it, "We are no longer dealing with the fiber in its normal state but a fiber which has been chemically and physically modified."

It obviously was impossible to study all of the acid, milling, chrome, soluble vat and vat dyes available. The following dyes were selected as being representative of each class:—

Acid Dyes

Calcocid Orange Y Extra Conc. (C. I. 151).
Calcocid Alizarine Red RR (C. I. 1091).
Calcocid Yellow 2G (C. I. 639).

Milling Dyes

Novazol Blue B (Pr. 128).
Acid Milling Red R Conc. (C. I. 487).
Polar Yellow 2G Conc. (C. I. 642).

Acid (Metallized) Dyes

Neolan Blue 2G (Pr. 144).
Neolan Pink BA (Pr. 326).
Nealon Yellow CR Conc. (Pr. 331).

Chrome Dyes

Omega Chrome Brilliant Blue B (C. I. 720).
Omega Chrome Brown EB Conc. (Pr. 14).
Omega Chrome Brown PG (Pr. 4).
Chromosol Yellow C Conc. (C. I. 343).

Soluble Vats

Algosol Brown IBR-CF (Pr. 118).
Algosol Blue O4B (C. I. 1184).
Algosol Green IBW Paste (C. I. 1101).
Algolsol Olive Green IB-CF (Pr. 293).
Algosol Pink IR Supra (Pr. 109).
Algosol Yellow GCA (Pr. 9).

Vat Dyes

Vat Brown G Paste (Pr. 121).
Brilliant Indigo 4BR Paste (C. I. 1184).
Vat Orange R Paste (C. I. 1217).
Vat Red Violet RH Paste (C. I. 1212).

Since the work was done in several laboratories it was decided to standardize the dyeing procedures and in all cases except vats, a liquor ratio of 60-1 was adopted. The procedure follows:

Acid Dyes—0.25 and 1% dyeings were made using 10% anhydrous Glauber's salt, 3% sulfuric acid (98%). The thoroughly wet out material was entered into the dyebath at 120° F., raised to the boil in 30 minutes and the dyeing continued at the boil for one hour. The dyed fabric was rinsed and dried.

Milling Dyes—0.25% and 1% dyeings were made using 10% anhydrous Glauber's salt and 6% ammonium sulfate. The thoroughly wet out material was entered into the dyebath at 110° F., raised to the boil in 30 minutes and boiled for 30 minutes, at which time 2% acetic acid (28%) was added and dyeing continued at the boil for 30 minutes longer. The dyed fabric was rinsed and dried.

Acid (Metallic Dyes)—0.25 and 1% dyeings were made. The thoroughly wet out material was entered into a dyebath at 120° F. containing 3% sulfuric acid (98%), the dyebath brought to a boil in 20 minutes and boiled for 30 minutes, after which time 3% sulfuric acid was added and the dyeing continued at the boil for one hour. The material was rinsed and dried.

Chrome Dyes

Top-Chromed

1% Chromosol Yellow C Conc.
10% Calc. Glauber's salt.
1% Acetic acid 56%, boil 45 minutes, add
0.5% Sodium bichromate, boil 45 minutes.

0.25% Chromosol Yellow C Conc.
10% Calc. Glauber's salt.
1% Acetic acid 56%, boil 45 minutes, add
0.25% Sodium bichromate, boil 45 minutes.

1% Omega Chrome Brown PG.
10% Calc. Glauber's salt.
2.5% Acetic acid 56%, boil 30 minutes, add
1% Acetic acid 56%, boil 15 minutes, add
0.5% Sodium bichromate, boil 45 minutes.

0.25% Omega Chrome Brown PG.
10% Calc. Glauber's salt.
1% Acetic acid 56%, boil 30 minutes, add
1% Acetic acid 56%, boil 15 minues, add
0.25% Sodium bichromate, boil 45 minutes.

1% Omega Chrome Brown EB Conc.
10% Calc. Glauber's salt.
1% Acetic acid 56%, boil 30 minutes, add
1% Acetic acid 56%, boil 15 minues, add
0.25% Sodium bichromate, boil 45 minutes.

0.25% Omega Chrome Brown EB Conc.
10% Calc. Glauber's salt.
1% Acetic acid 56%, boil 30 minutes, add
1% Acetic acid, 56%, boil 15 minues, add
0.25% Sodium bichromate, boil 45 minutes.

1% Omega Chrome Brilliant Blue B.
10% Calc. Glauber's salt.
0.5% Acetic acid 56%, boil 30 minutes, add
0.5% Sodium bichromate, boil 45 minutes.

0.25% Omega Chrome Brilliant Blue B.
10% Calc. Glauber's salt.
1% Acetic acid 56%, boil 30 minutes, add
0.5% Acetic acid 56%, boil 15 minues, add
0.25% Sodium bichromate, boil 45 minutes.

Metachrome

1% Chromosol Yellow C Conc.
1% Omega Chrome Brilliant Blue B.
3% Ammonium sulfate.
1% Sodium chromate.
Boil 1¼ hours.

1% Omega Chrome Brown PG.
1% Omega Chrome Brown EB Conc.
3% Ammonium sulfate.
1% Sodium chromate, boil 45 minutes.
1% Acetic acid 56%, boil 30 minutes.

All 0.25% dyeings were conducted in the following manner:
2% Ammonium sulfate.
1% Sodium chromate, boil 1¼ hours.

Solubilized Vats

0.25 and 1% Dye.
10% Glauber's salt.
5% Ammonium sulfate.

Enter thoroughly wet out material in dyebath at 105° F. Raise to boil in 30 minutes. Add 5% acetic acid (28%) and continue boiling for 30 minutes; rinse well.

Developing Bath

1% Ammonium sulfocyanide.
Bichromate of soda.
For all colors except pink:
0.7% for 0.25% shade.

1.0% for 1% shade.
For pink:
1.1% for 0.25% shade.
1.4% for 1% shade.

run ¼ hour at 85° F., then add 10 g/l sulfuric acid (98%).

Bring up to 185° F. in ½ hour; run ½ hour at this temperature; rinse and neutralize with 2 g/l soda ash; rinse and dry.

Vats

(a) Stock Vat: 12.0 g. dyestuff paste.
4.0 ml. Turkey Red Oil* See note.
278.0 ml. Hot Water.
6.0 ml. Caustic Soda solution, 36% by weight.
300.0 ml. adjust temperature to 160° F., add
3.0 gm. Sodium hydrosulfite Conc., reduce for 10 minutes with occasional stirring.

(b) Dye Bath: for 20 grams wool, ratio 1:40, stainless steel.

	1.5% dyeings	*6.0% dyeings*
Water at 120°F	785.7 ml.	762.0 ml.
Glue, 10% solution	4.0 ml.	4.0 ml.
Ammonia, 26°Bé	1.6 ml.	2.4 ml.
Sodium hydrosulfite, Conc	1.2 gm.	1.6 gm.
Stock vat (a)	7.5 ml.	30.0 ml.
Total	800.0 ml.	800.0 ml.

* In the case of Vat Brown G, 4 ml. of a 10% solution of Nacconol NR was used in place of the Turkey Red Oil.

The material, which has previously been treated for 30 minutes at 100° F. in a bath containing 3% Nacconol NR and 1½% ammonia, was entered into the above dye liquor and run for 5 minutes at 120° F. the temperature was then raised to 130° F. and the dyeing continued for 20 minutes, treated in cold running water for 10 minutes, oxidized for 15 to 20 minutes in a bath containing 3% potassium persulfate, starting at 110° F. and raising the temperature gradually to 140° F.

It was then soured for 10 minutes with sulfuric acid, rinsed twice with warm water, followed by a treatment for 15 minutes at 140° F. in a bath containing 2½ grams of Nacconol NR per liter and finally by another warm water rinse. Extracted and ironed dry without tension.

Dyeometer Studies

Procedure

The Dyeometer used in these studies has been described by Kienle, Royer, and McCleary *(16)*. In this work a specially designed glass stirrer was used. This glass stirrer was made so that eight one-half-gram samples and one four-gram sample could be arranged radially around the stirrer. The one-half-gram samples could be removed from the dyebath without disturbing the pieces remaining. The heating mechanism was modified so that the dyebath could be heated from about 110-120° F. to the boil at a uniform rate.

With the exception of the time required to bring the dye solutions to the boil, which in these experiments was 40 minutes, the dyeing procedures used with the acid, milling, acid (metallized), and chrome colors were essentially the same as the procedures described in the preceding paragraphs.

In preparing the test pieces for the Dyeometer, long nylon threads were attached to each of the one-half-gram samples. After the pieces were attached to the stirrer the nylon threads were led out through a piece of glass tubing which was inserted in a rubber stopper. This stopper formed the cover of the dyebath portion of the Dyeometer. As the dyeing proceeded, the one-half-gram samples were removed from the dyebath at periodic intervals by means of the nylon thread.

In the Dyeometer studies the liquor ratio was maintained at 60-1 during the entire dyeing procedure. This was maintained in the following manner: At the start of the dyeing the stirrer containing the thoroughly wetted out samples was placed in the dyebath. At predetermined intervals, one of the half-gram pieces of fabric was removed by pulling it up through the glass tube. Immedicately thereafter an aliquot of the solution was removed by means of a stopcock located at the bottom of the dyebath. As the dyeing proceeded, the chemicals that had to be added were based on the quantity of fabric remaining in the system. The four-gram pieces remained in the dyebath until the dyeing was completed.

Results

The results obtained from the Dyeometer studies are given in the following graphs:—

The metachrome dyeings will be discussed in a separate section.

In Figs. 1-25 two sets of curves are plotted thereon, 1, the percent dyebath strength vs. time, and 2, the increase in color value on the fabric vs. time. The data for the series of curves showing percent dyebath strength vs. time was calculated from the change in transmission of light through the Dyeometer cell as recorded by spectrophotometer, and described by Kienle, et al. *(16)*. The curves showing the color value were based on data obtained from spectrophotometric measurements taken at the point of maximum reflectance and are referred back to the color value of the completed dyeing on Fabric A as 100.

Discussion of Results

Calcocid Orange Y was studied only in combination with Fabric A, B and C. In studying Fig. 1 four things become apparent. One, most of the dye (approx. 90%) was removed from the dyebath in the first 10 minutes. Two, as the temperature of the dyebath increased, the quantity of the dye in solution increased until the boil was reached, after which the quantity present remained constant, i.e. some of the dye picked up by the fibers is released and goes back into solution. Third, the color value was the same for all three fabrics. A maximum apparent strength was reached before 10 minutes. As the dyeing continued, the strength decreased, levelling off after the boil. Fourth, during the first 10-12 minutes Fabric C exhausted the bath at a slightly slower rate than either Fabric A or Fabric B and after this time the rates were practically identical.

Calcocid Alizarine Red RR was dyed on all six fabrics. A study of Figs. 2 and 3 show that the treatments accorded to these fabrics changed the dyeing characteristics of the wool considerably. If the curve showing the manner in which the dyebath was exhausted using Fabric A is taken as the standard it will be seen

Calcocid Orange Y	Fig. 1	Fabric A, B and C
Calcocid Alizarine Red RR	Fig. 2	Fabric A, B and C
Calcocid Alizarine Red RR	Fig. 3	Fabric D, E and F
Calcocid Fast Yellow 2G	Fig. 4	Fabric A, B and C
Calcocid Fast Yellow 2G	Fig. 5	Fabric D, E and F
Novazol Blue B	Fig. 6	Fabric A, B and C
Novazol Blue B	Fig. 7	Fabric D, E and F
Acid Milling Red R Conc	Fig. 8	Fabric A, B and C
Acid Milling Red R Conc	Fig. 9	Fabric D, E and F
Polar Yellow 2G	Fig. 10	Fabric A, B and C
Polar Yellow 2G	Fig. 11	Fabric D, E and F
Neolan Blue 2G	Fig. 12	Fabric A, B and C
Neolan Blue 2G	Fig. 13	Fabric D, E and F
Neolan Pink BA	Fig. 14	Fabric A, B and C
Neolan Pink BA	Fig. 15	Fabric D, E and F
Neolan Yellow GR	Fig. 16	Fabric A, B and C
Neolan Yellow GR	Fig. 17	Fabric D, E and F
Omega Chrome Brill. Blue B Top Chromed	Fig. 18	Fabric A, B and C
Omega Chrome Brill. Blue B Top Chromed	Fig. 19	Fabric D, E and F
Omega Chrome Brown EB Conc. Top Chromed	Fig. 20	Fabric A, B and C
Omega Chrome Brown EB Conc. Top Chromed	Fig. 21	Fabric D, E and F
Omega Chrome Brown PG Top Chromed	Fig. 22	Fabric A, B and C
Omega Chrome Brown PG Top Chromed	Fig. 23	Fabric D, E and F
Chromosol Yellow C Conc. Top Chromed	Fig. 24	Fabric A, B and C
Chromosol Yellow C Conc. Top Chromed	Fig. 25	Fabric D, E and F

that the rates of exhaust with Fabric E and F were similar and approximately equal to the rate with Fabric A, the rate with Fabric C was slower, the rate with Fabric B was faster and the rate with Fabric D was very much faster.

The color value of the six fabrics developed in widely differing ways. Fabric A developed to full strength within the first 15 minutes, with no visual change occurring during the remainder of the dyeing. When Fabric C was used, the color value developed in a similar manner, with the exception that the final piece was 10% stronger. When Fabric B was used the color value developed at a much more rapid rate at the beginning of the dyeing; the rate slowed down until a maximum was reached in about 50 minutes, and then as the dyeing continued the apparent strength fell off until the final piece showed 10% weaker. With Fabrics D, E and F the apparent strength developed very rapidly, reaching a maximum in the case of Fabrics D and E in 20 minutes, this maximum being about 40% stronger than the strength of the finished dyed fabric.

The data obtained with Calcocid Fast Yellow 2G are given in Figures 4 and 5. Here again it is apparent that the treatments of the fabric influenced the dyeing rates considerably. Again using rate of exhaust of Fabric A as the standard, it will be seen that the rate of exhaust using Fabrics B and E are similar but slower and that the rate of Fabric F was much slower. When Fabric C was used the rate was considerably slower, whereas with Fabric D the rate was very much faster. The final exhaust with all six fabrics was between 80 and 90%.

The rate of development of color value followed somewhat the same pattern. Fabrics A, B and E developed strength at about the same rate, whereas Fabric F developed strength at a slightly slower rate. Fabric A, B and E reached a maximum strength in 30-40 minutes, after which the apparent strength developed levelled off, whereas with Fabric F the maximum was not reached until 50 minutes. With Fabric C the color value developed very slowly and the maximum strength was not obtained until the end of the dyeing procedure. The apparent strength of the dyeing on Fabric D developed at an extremely fast rate and reached a sharp maximum of 160% after 10 minutes in the dyebath.

Milling Dyes

The data obtained with the three milling dyes are given in Figures 6 and 7 (Novazol Blue B), Figures 8 and 9 (Acid Milling Red R) and Figures 10 and 11 (Polar Yellow 2G). A study of the dyebath exhaust curves of these milling dyes substantiates the findings of Goodall *(17)*. These data also show that the various fabrics used in this investigation had pronounced influence on the rate of dyebath exhaustion. Many of the curves show some distinct breaks, indicating abrupt changes in the rate of dyebath exhaustion. To explain completely the significance of these changing rates would require more data and is beyond the scope of this paper. They may be partially explained, however, by the simultaneous occurrence of several physical changes in the dyebath. The most important among these is the change of the state of aggregation of these dyes from colloidal at low temperatures to true solution at high temperature. The initial rapid exhaustion, particularly pronounced with Polar Yellow 2G, may be due to surface absorption of the relatively large dye particles at low temperature. The breaking up of the dye particles at elevated temperature enables them to diffuse into the fibers and at the same time change their contribution to reflectance on the fabric as well as to light absorption in the solution.

Since the spectrophotometer records the intensity of the color present in the Dyeometer cell, it is apparent that if the increase in color intensity due to the dispersion of the aggregates proceeds at the same rate as dye is removed by adsorption on the fiber or diffusion into the fiber, dyeing can take place with little change in the recorded exhaustion rate.

When Fabrics A, B, C and F were dyed with Acid Milling Red R less than 30% of the dye was removed until the dyebath reached the boil. After this the dye was exhausted quite rapidly. It is interesting to note that the addition of the acetic acid did not influence either the rate of exhaust or extent of exhaust to any great extent. The rate of color value development using these fabrics and this dye followed the exhaustion rate quite closely. The rate of development was slow during the initial stages of the dyeing up to the boil. When the boil had been reached the rate of development increased rapidly during the first 30 minutes, after which it levelled off. When Fabric D was dyed the dyebath was exhausted quite rapidly with the rate of exhaust increasing after the temperature of the bath had reached 160° F. The color value development showed the same patterns with the maximum strength being reached at the boil with no apparent change thereafter.

When Fabric A, B and C were dyed with Novazol Blue B the exhaustion of the dyebath and the color value developed followed a pattern very similar to that obtained with Acid Milling Red R. Here, however, the rate of exhaustion was increased noticeably by the addition of acetic acid. When Fabrics E and F were dyed with Novazol Blue B, the rate of exhaust was not influenced to any great extent by the increase in temperature. The action of the acetic acid addition was very pronounced, particularly with Cloth F.

The rate of exhaustion and of color value development when Fabric D was used were much more rapid than with any of the other fabrics.

After the initial drop, the curves obtained when Fabric B, E. and F were dyed with Polar Yellow 2G are almost parallel with the time axis, indicating that the effect of the changes occurring simultaneously in the dyebath compensate one another. When Fabrics A, C and D were used the rate of exhaustion seems to dominate the other change. The rate and extent of exhaust were influenced to a large extent by the new addition of the acetic acid.

Acid (Metallized) Dyes

The data obtained when the six fabrics were dyed with metallized dyes are given in Figs. 12, and 13, (Neolan Blue 2G), Figs. 14, and 15, (Neolan Pink BA), and Figs. 16 and 17 (Neolan Yellow 2G). As was to be expected, the dyeing characteristics of these dyes were very similar to those of the acid dyes.

If the rate of dyebath exhaust of Neolan Blue 2G on Fabric A is taken as standard, it can be seen that the rate of exhaust of Neolan Pink BA was slower and the rate of exhaust of Neolan Yellow GR was very much slower. When the curves for Neolan Blue 2G and Neolan Pink BA are examined, it will be seen that Fabrics C and F, which were chlorinated on the alkaline side, exhausted the dyebath very much slower than did Fabric A. On the other hand, when Neolan Yellow GR was used the rates of exhaust with Fabric A and C were almost identical whereas the rate with Fabric F was more rapid.

Here again Fabric D was unique in the extremely rapid rate at which it exhausted all of the dyes studied.

In general, Fabrics B and E showed similar dyeing characteristics. When dyed with Neolan Blue 2G and Neolan Pink BA the curves obtained were almost identical, the rate of exhaust being more rapid than the rate with Fabric A. When Neolan Yellow GR was used, Fabric E exhausted the dyebath at a rate slower than did Fabric B.

All of the fabrics, with the exception of Fabrics B and D, developed color value quite normally. With minor irregularities, the rate of development of color

value was quite rapid at first, slowed down near the boil and finally leveled off. With Fabric B the color value development was somewhat erratic, especially during the 40 minutes that was required to bring the dyebath to the boil. When Neolan Pink BA and Neolan Yellow GR were used the color value developed very rapidly, reaching a maximum just as the boil was reached. This maximum was, in both cases, about 20 percent stronger than the final dyed piece. As the dyeing proceeded the color value fell rapidly during the next 10 minutes, after which the color value remained more or less unchanged. When Neolan Blue 2G was used with Cloth B the maximum color value was not reached until the dyeing was complete. The pronounced affinity that Fabric D has for dyes was again in evidence with the Neolan dyes. The rate of color value development was extremely rapid at first. With Neolan Blue 2G and Neolan Yellow GR the maximum color value was reached within 20 minutes, whereas with Neolan Pink BA the maximum was reached only after 30 minutes. In every case the maximum strength was about 20 percent stronger than standard. As the dyeing continued the color value diminished until, at the end of the dyeing procedure, all three pieces were approximately 10-15 percent weaker than standard.

Chrome Dyes

Top-Chromed

The data obtained when the six fabrics were dyed by the top-chrome method are given in Figs. 18 and 19 (Omega Chrome Brilliant Blue B), Figs. 20 and 21 (Omega Chrome Brown EB), Figs. 22 and 23 (Omega Chrome Brown PG) and Figs. 24, and 25 (Chromosol Yellow C). The treatments accorded to the fabrics have altered the dyeing characteristics considerably.

It will suffice to make the following general observations: 1. With Omega Chrome Brilliant Blue B and Omega Chrome Brown EB there was a sharp rise in color value immediately after the addition of the sodium dichromate. This sharp rise was followed by an equally sharp decrease. 2. Those fabrics which were chlorinated on the alkaline side exhausted all of these dyes at a slower rate. 3. Fabric D exhausted these dyes at a much more rapid rate and developed color value more rapidly than any of the other fabrics.

Metachrome

The Dyeometer was not used in combination with the spectrophotometer to determine the rate of dyebath exhaustion when the four chrome dyes were applied by the metachrome method because the introduction of the sodium dichromate produced color changes which were difficult to analyze. It was used, however, to determine the rate of color value development.

Color Value Development

The data on color value development are given in Tables No. V-VIII.

Table No. V

Omega Chrome Brilliant Blue B
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E
10 mins....	1	2½	8	4½	15	11
20 mins....	2	4½	15	10	27	12
30 mins....	3	11	24	25	40	15
40 mins....	4	26	38	46	72	26
55 mins....	5	67	58	65	110	45
70 mins....	6	94	87	90	115	70
85 mins....	7	92	70	86	120	85
100 mins....	8	86	80	85	115	105
130 mins....	9	*100*	80	105	115	105

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. VI

Omega Chrome Brown EB Conc.
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E
10 mins....	1	7	10	7	25	14
20 mins....	2	17	18	18	42	27
30 mins....	3	38	38	38	87	43
40 mins....	4	63	62	57	101	56
55 mins....	5	84	74	67	108	71
70 mins....	6	83	86	70	106	79
85 mins....	7	83	85	69	110	72
100 mins....	8	81	78	75	106	80
130 mins....	9	*100*	91	92	114	96

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. VII

Omega Chrome Brown PG
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E	F
10 mins..	1	5	5	2½	11	5	6
20 mins..	2	9	7	5½	18	6	11
30 mins..	3	13	10	10	29	7	14
40 mins..	4	22	13	19	39	9	19
55 mins..	5	36	20	34	54	14	30
70 mins..	6	55	30	43	75	20	40
85 mins..	7	64	40	54	94	28	66
100 mins..	8	66	45	69	94	37	79
130 mins..	9	*100*	90	100	110	110	130

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. VIII

Chromosol Yellow C Conc.
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E
10 mins....	1	19	22	12	46	28
20 mins....	2	34	38	20	56	29
30 mins....	3	56	50	33	67	38
40 mins....	4	78	54	54	77	48
55 mins....	5	81	83	72	84	54
70 mins....	6	94	97	83	92	75
85 mins....	7	88	94	81	95	76
100 mins....	8	90	90	85	95	90
130 mins....	9	*100*	94	87	100	97

*Based on strength of final dyed piece of Fabric A as being 100.

Discussion

With all of the chrome dyes, Fabric B developed color value more rapidly than Fabric A but the color value of the finished dyed piece was in every case less.

With all four chrome dyes, Fabric D developed color value much more rapidly than Cloth A. The color value obtained with Chromosol Yellow C was equal to that obtained with Fabric A. With the other three dyes, values 10-15 percent stronger were obtained.

The bahavior of Fabrics C and E was somewhat erratic. When dyed with Omega Chrome Brilliant Blue B, both fabrics developed color value more rapidly than Fabric A during the early stages of the dyeing. The final dyeings were about 5 per cent stronger. With Omega Chrome Brown EB the rate of development with Fabric C was about equal to, whereas during the early portion of the dyeing process the rate with Fabric E was faster than the rate with Fabric A. The strengths of the final dyed pieces were noticeably less. When Omega Chrome Brown PG was used to dye these two fabrics, the initial rate of development was slower but the strength of the final dyed piece was either equal to that of or 10 percent higher than that of Fabric A. With Chomosol Yellow C Fabric C developed color value slower than A over the entire dyeing process, resulting in a dyeing that was more than 10 percent weaker than standard.

Degree of Chroming

The degree of chroming can be determined from the shade of the dyed material. This is most easily accomplished by the use of spectrophotometric curves. Using the curve of a dyed but unchromed piece to represent 0% chroming and that of a dyed and chromed piece as 100% chroming, the degree of chroming at any intermediate stage can be determined by interpolation. The rate of exhaustion was determined in one set of experiments (top-chrome) with unchromed dye; and in another set of experiments carried out with the metachrome method, the degree of chroming was calculated under the

Table No. IX

Omega Chrome Brilliant Blue B
Percent Degree of Chroming*

Time	Piece No.	Fabric A	B	C	D	E
10 mins....	1	9	20	10	7	8
20 mins....	2	10	22	20	12	12
30 mins....	3	15	28	45	18	25
40 mins....	4	27	42	58	38	50
55 mins....	5	55	65	72	55	80
70 mins....	6	65	85	82	68	85
85 mins....	7	85	90	85	85	95
100 mins....	8	88	95	90	90	97
130 mins....	9	100	100	100	100	100

*These values were determined using the final dyed piece of each fabric as 100. They are not referred back to Fabric A.

assumption that the rate of exhaustion was not influenced by the presence of the sodium dichromate. If any other factor affects the shade, however, errors in the calculation are introduced. Some of the chlorination treatments given to the fabrics did cause shade changes to occur. Consequently the figures given are not absolutely correct but nevertheless are indicative of what has taken place.

The data obtained are given in Tables No. IX-XII.

Table No. X

Omega Chrome Brown EB Conc.
Percent Degree of Chroming*

Time	Piece No.	Fabric A	B	C	D	E
10 mins....	1	15	20	30	30	18
20 mins....	2	15	22	32	30	20
30 mins....	3	25	35	55	45	50
40 mins....	4	80	90	100	100	90
55 mins....	5	100	100	100	100	100
70 mins....	6	100	100	100	100	100
85 mins....	7	100	100	100	100	100
100 mins....	8	100	100	100	100	100
130 mins....	9	100	100	100	100	100

*These values were determined using the final dyed piece of each fabric as 100. They were not referred back to Fabric A.

Table No. XI

Omega Chrome Brown PG
Percent Degree of Chroming*

Time	Piece No.	Fabric A	B	C	D	E	F
10 mins...	1	6	15	20	10	20	8
20 mins...	2	6	35	20	10	40	8
30 mins...	3	6	45	25	18	50	8
40 mins...	4	14	50	48	32	55	25
55 mins...	5	53	60	72	68	70	55
70 mins...	6	67	75	80	85	80	75
85 mins...	7	90	90	90	90	85	88
100 mins...	8	93	95	95	95	90	95
130 mins...	9	100	100	100	100	100	100

*These values were determined by using the final dyed piece of each fabric as 100. They were not referred back to Fabric A.

Table No. XII

Chromosol Yellow C Conc.
Percent Degree of Chroming*

Time	Piece No.	Fabric A	B	C	D	E
10 mins....	1	15	10	15	8	15
20 mins....	2	18	10	20	10	15
30 mins....	3	20	20	25	15	20
40 mins....	4	30	40	45	30	30
55 mins....	5	70	65	75	65	55
70 mins....	6	85	80	85	85	70
85 mins....	7	90	85	90	90	78
100 mins....	8	100	90	95	95	90
130 mins....	9	100	100	100	100	100

*These values were determined by using the final dyed piece of each fabric as 100. They were not referred back to Fabric A.

CALCOCID ORANGE Y

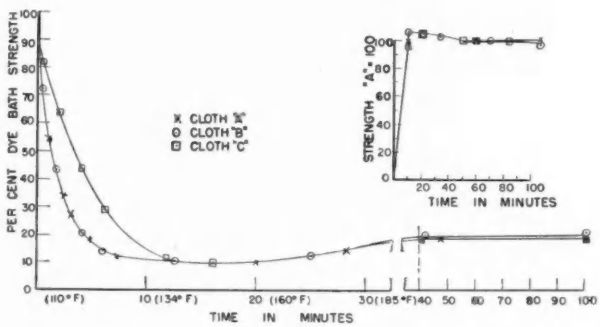


Figure 1

CALCOCID ALIZARINE RED RR

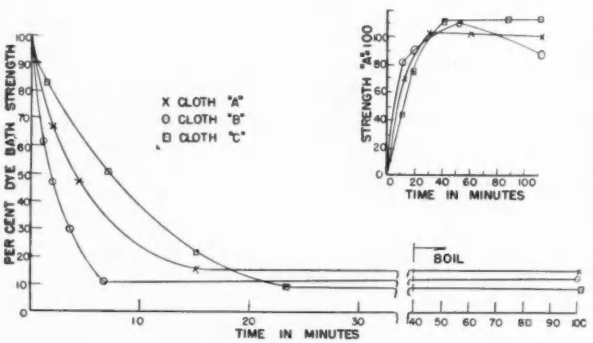


Figure 2

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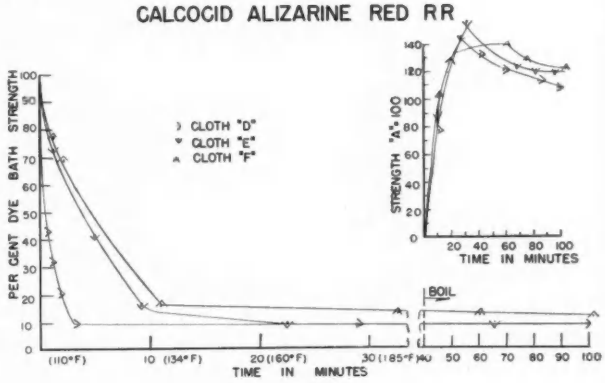

Figure 3

CALCOCID FAST YELLOW 2G

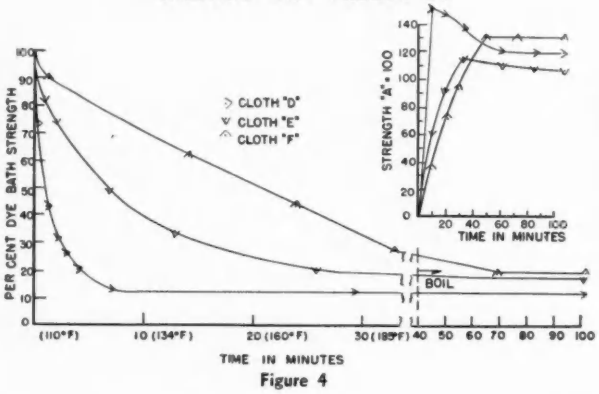

Figure 4

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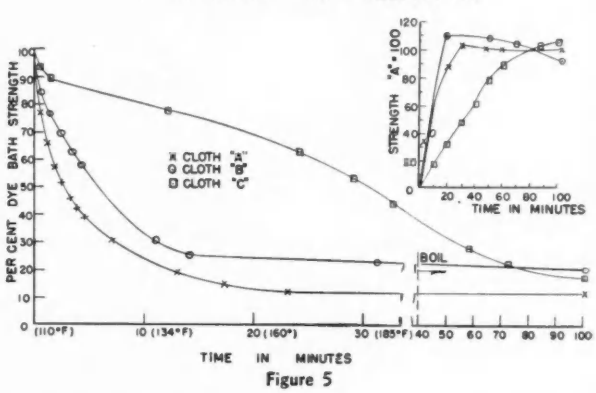
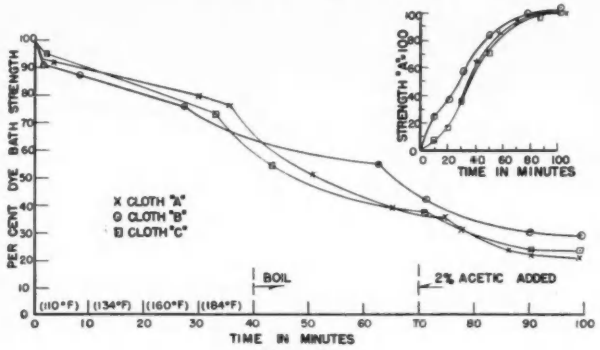


Figure 5

NOVAZOL BLUE B



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NOVAZOL BLUE B

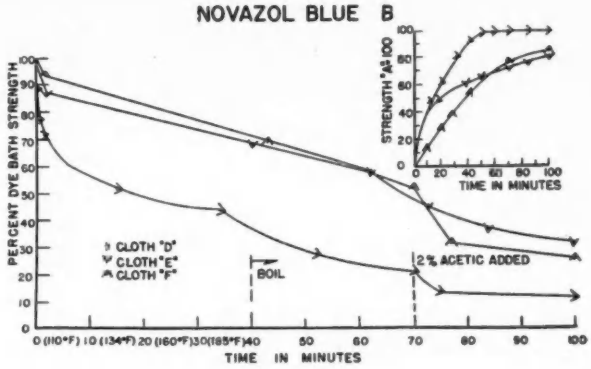

Figure 7

ACID MILLING RED R

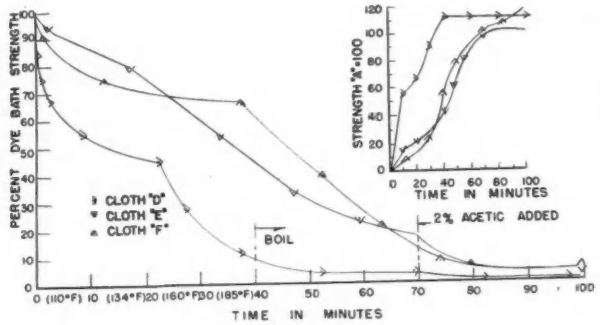

Figure 8

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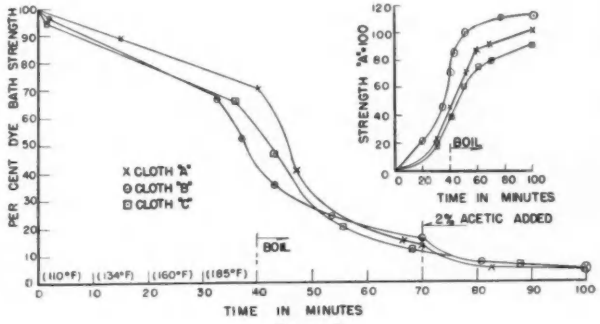


Figure 9

POLAR YELLOW 2G

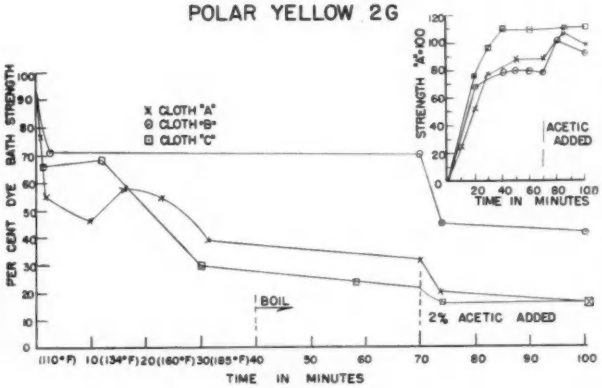


Figure 10

POLAR YELLOW 2G

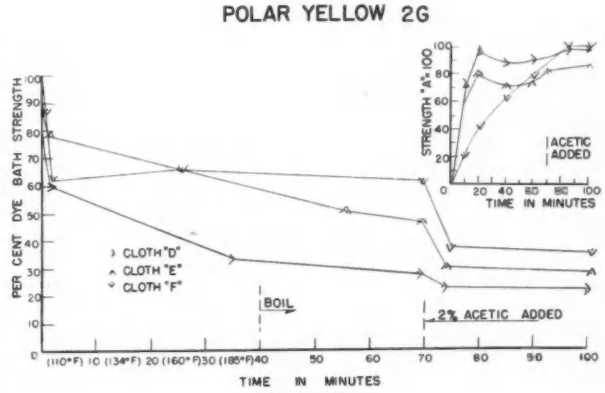


Figure 11

NEOLAN BLUE 2G

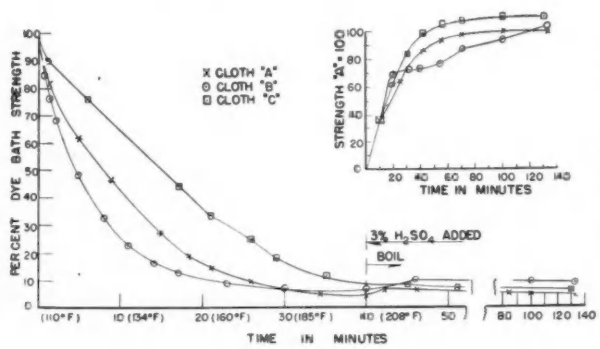
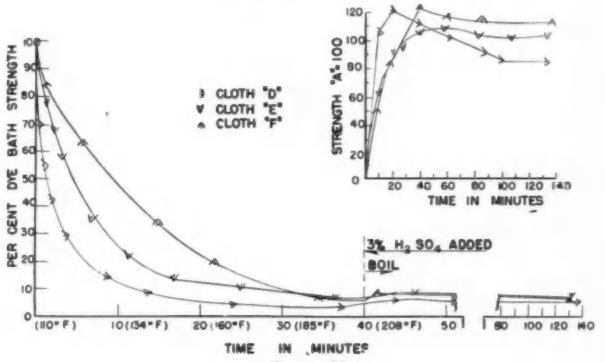


Figure 12

NEOLAN BLUE 2G



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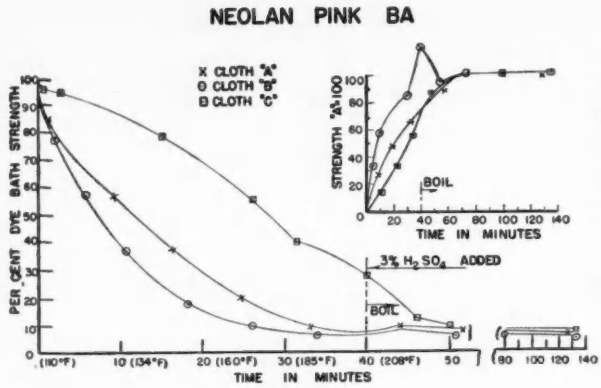

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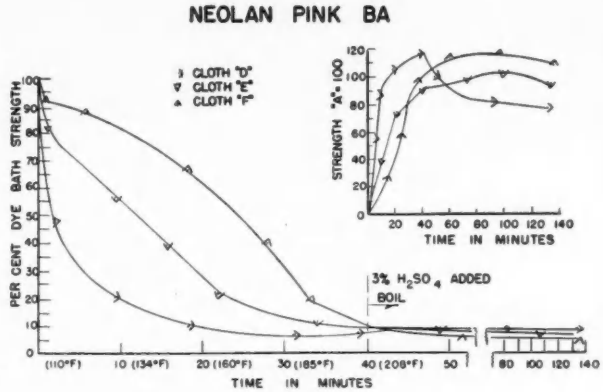

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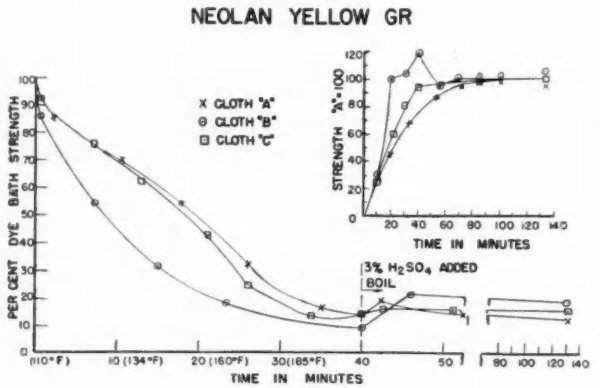

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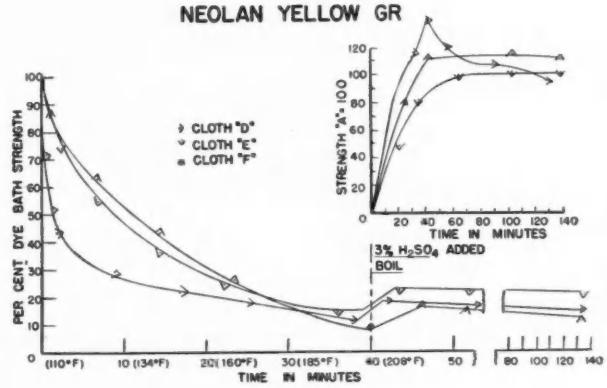

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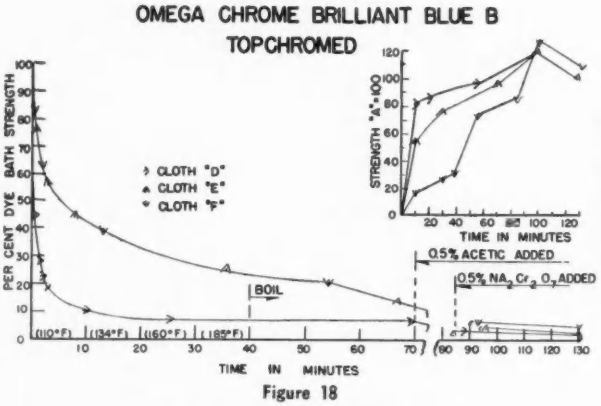

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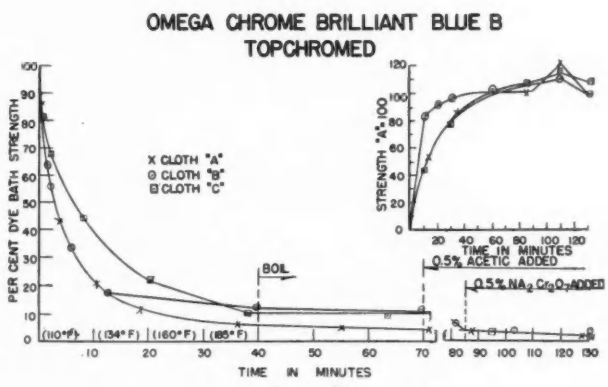

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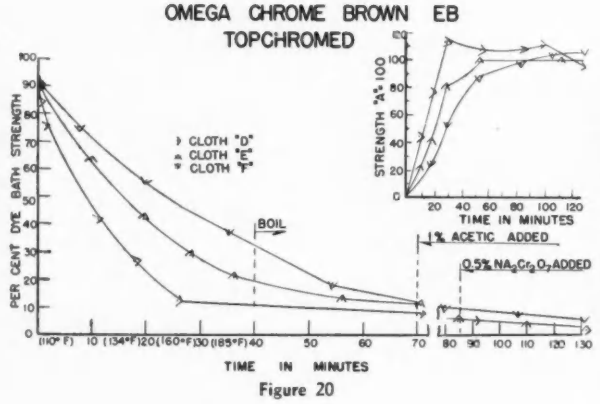

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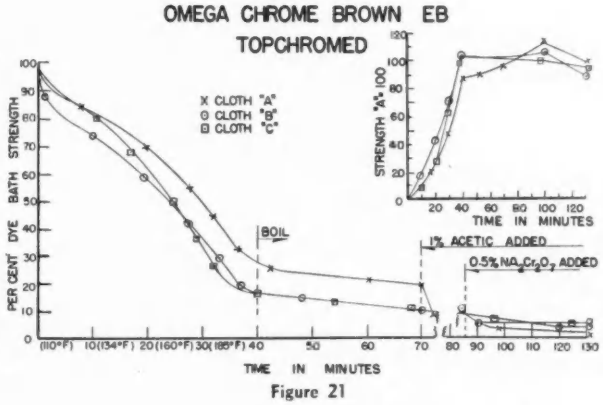

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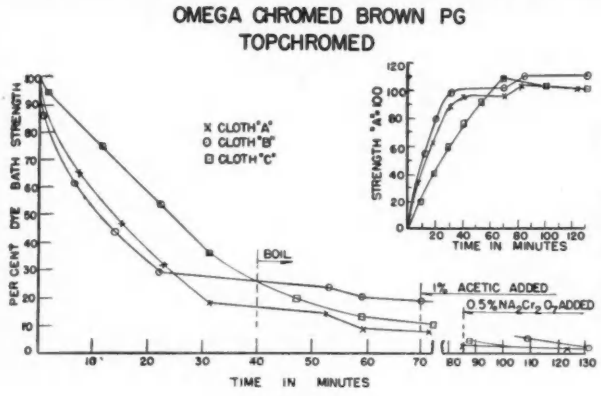

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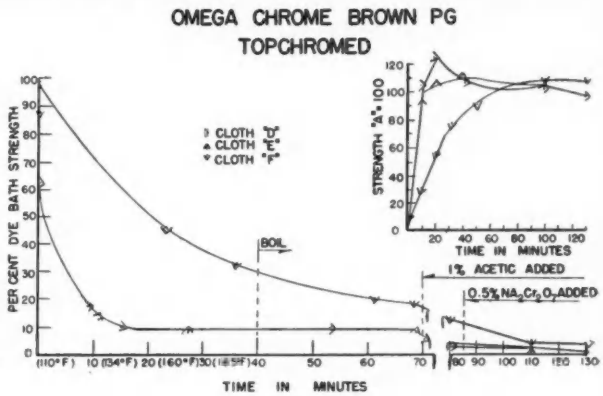

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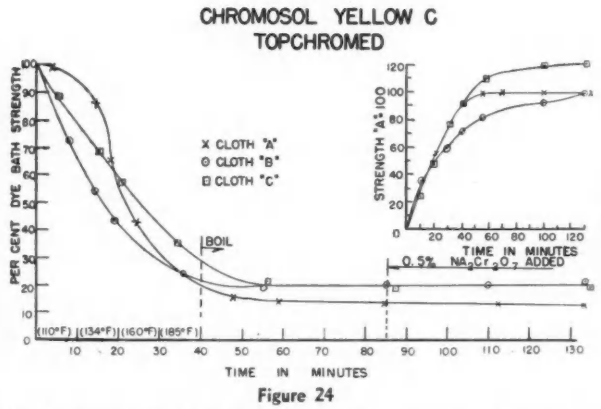

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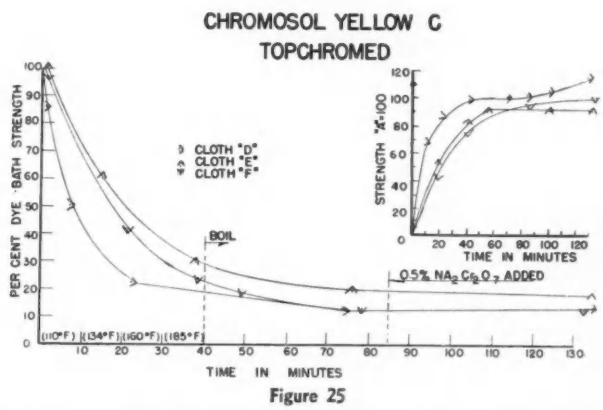

Figure 25

Rate of Color Value Development of Solubilized Vat Dyes

Because of the particular difficulties which the solubilized vat dyes present, they have not been included in the Dyeometer studies. Instead, the increase of the color value was followed by periodical removal of samples from beaker dyeings and by the visual evaluation of these samples after full development. The results are given in Tables XIII-XVIII.

While the completed dyeings show little or no difference in the color value there are, in many cases, considerable differences in the rate of development of the color values. After the first 15 minutes Fabric B and D show greater color values than any of the other fabrics. The C and F materials dye more slowly than A while E is not appreciably changed.

After 30 minutes the differences in color value are practically eliminated. An exception is Fabric E, which lags behind the others for 45 minutes or longer with all dyes except Algosol Green IBW Paste.

The behavior of Algosol Brown IBR-CF shows a number of differences from the other dyes, but the dependence of the shade with this dye on the treatment of the fabric makes the evaluation of the results doubtful.

Table No. XIII

1% Algosol Blue 04B
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E	F
15 min. (about 160°F.)	1	20	45	15	50	20	20
30 min. (at the boil)	2	70	70	65	85	55	70
45 min. (boiled 15 min.)	3	80	80	80	90	60	80
60 min. (boiled 30 min.)	4	90	85	90	85	60	85
75 min. (addition of acid and boiled 15 min.)	5	90	90	95	90	65	95
90 min. (completed dyeing)	6	*100*	100	105	95	90	97

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. XIV

1% Algosol Pink IR Supra
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E	F
15 min. (about 160°F.)	1	15	22	10	27	20	10
30 min. (at the boil)	2	50	50	55	70	45	50
45 min. (boiled 15 min.)	3	75	50	75	70	45	55
60 min. (boiled 30 min.)	4	90	70	85	80	50	60
75 min. (addition of acid and boiled 15 min.)	5	100	100	95	90	75	95
90 min. (completed dyeing)	6	*100*	100	100	95	90	102

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. XV

1% Algosol Yellow GCA
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E	F
15 min. (about 160°F.)	1	8	12	5	20	12	8
30 min. (at the boil)	2	70	65	60	90	45	40
45 min. (boiled 15 min.)	3	90	85	90	90	55	75
60 min. (boiled 30 min.)	4	90	90	95	90	75	80
75 min. (addition of acid and boiled 15 min.)	5	100	95	100	90	90	95
90 min. (completed dyeing)	6	*100*	100	100	97	97	97

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. XVI

1% Algosol Olive Green IB-CF
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E	F
15 min. (about 160°F.)	1	8	15	2	30	12	3
30 min. (at the boil)	2	40	40	20	65	35	25
45 min. (boiled 15 min.)	3	85	80	70	80	65	60
60 min. (boiled 30 min.)	4	90	85	85	80	75	80
75 min. (addition of acid and boiled 15 min.)	5	90	95	90	85	85	90
90 min. (completed dyeing)	6	*100*	110	97	100	103	100

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. XVII

1% Algosol Green IBW Paste
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E	F
15 min. (about 160°F.)	1	15	27	10	40	27	12
30 min. (at the boil)	2	70	75	50	75	80	65
45 min. (boiled 15 min.)	3	85	90	95	80	85	85
60 min. (boiled 30 min.)	4	90	90	100	80	95	85
75 min. (addition of acid and boiled 15 min.)	5	100	90	105	80	95	85
90 min. (completed dyeing)	6	*100*	95	105	90	105	90

*Based on strength of final dyed piece of Fabric A as being 100.

Table No. XVIII

1% Algosol Brown IBR-CF
Percent Color Value*

Time	Piece No.	Fabric A	B	C	D	E	F
15 min. (about 160°F.)	1	10	10	3	30	10	3
30 min. (at the boil)	2	30	30	8	75	45	8
45 min. (boiled 15 min.)	3	70	65	20	95	75	20
60 min. (boiled 30 min.)	4	80	65	30	95	85	30
75 min. (addition of acid and boiled 15 min.)	5	95	95	75	95	100	75
90 min. (completed dyeing)	6	*100*	100	85	112	107	95

*Based on strength of final dyed piece of Fabric A as being 100.

In many cases, while the dyeing has been relatively slow, the addition of the acid after the first 45 minutes accelerated the rate of dyeing appreciably.

The Evaluation of Dyeings Made by Conventional Laboratory Methods

Since dyeings have been prepared by conventional laboratory methods for study of the fastness properties, it was interesting to compare their color values with those obtained in the Dyeometer studies. The color value ratings were made visually.

Table No. XIX shows the color values determined on the 1% dyeings. (6% on vats). In the case of the acid, milling, metallized and chrome dyes no shade change has been recorded since the change, if any, was very slight. The color values are relative to the untreated Fabric A taken as 100.

Discussion

In the case of the acid, milling, metallized, chrome, and solubilized vat dyes the results show that there is no appreciable strength difference between the treated and untreated fabrics. The fact that the larger differences in color value found in the Dyeometer studies with some of the dyes were not observed visually may be due to the lower sensitivity of the visual method when compared with the spectrophotometer. In view of this consistency of visual color value and the previously mentioned shade consistence of these classes of dyestuffs it is apparent that the dyer, when taking the usual precautions, may use the same formula interchangeably on chlorinated and unchlorinated material, however, giving due consideration to the changes in the rates of exhaust as shown in the "Dyeometer" studies.

The foregoing conclusion is based only on the dyestuffs mentioned above; but many other dyestuffs of these classes, picked at random and dyed on the blank (A) and one of the chlorinated materials (picked at random), show the same consistency of shade and strength. It should be noted, however, that some of the more sensitive dyes, such as Sulphon Cyanine 5RA (C.I. 289) and Naphthol Green B (C.I. 5), show distinct shade changes on some of the chlorinated materials.

The vats do not show the same consistency of shade and strength. Since the chlorinated material in many cases dyes heavier than the unchlorinated, the dyer must use extreme caution when transferring his formulae.

It is interesting to note that, in the case of the vat dyes, the greatest increase in color yield is shown on those fabrics (B & E) which showed the highest alkali solubility values.

In connection with the dyeing properties of the colors studied, it is worthy of note that, in spite of the indications of uneven chlorination of some of the fabrics, most of the dyeings are even and well penetrated. Some lack of penetration is observed in the case of Algosol Brown IBR-CF and Algosol Olive Green IB-CF, but this is understandable in view of the fact that these two are the least level-dyeing of this class of colors and that no special precautions were taken in these studies to produce level dyeings.

Fastness Properties

Washing

Obviously the most important fastness property to be considered in the relation of dye application to wool with controlled shrinkage is the wash fastness. Therefore, extensive wash tests have been carried out on all the 1% dyeing (6% in the case of vats). One, three and five consecutive wash tests (1, 5 & 10 in the case of the Algosols) have been made according to the AATCC wool wash test No. 1 *(18)*. The wash tests have been evaluated on a basis of 5-0, 5 representing very good to excellent and 0 complete loss of color.

The results are listed in Table No. XX.

It is apparent from the results that the acid dyes, which are of poor fastness on unchlorinated material, are decidedly less fast on all the chlorinated materials except Fabric C. The milling colors, while faster on all materials than the acid colors, show a definite inferiority of wash fastness on all chlorinated materials except C. The greatest relative loss with both acid and milling colors is shown on the Fabrics B and E. The metallized and chrome dyes, which show progressively better wash fastness on the untreated materials, show progressively less differences between unchlorinated and chlorinated fabrics. Here again Fabric C rates the best, being practically the same as the untreated Fabric A, while Fabric E is the poorest. Solubilized vat and vat dyes show the best wash fastness, but here too, Fabric E is the poorest. While these colors have lost slightly in the first washing, very little further loss of color is shown even after 10 washings. This is typical of vat dyes since a certain amount of the unfixed dye usually remains on the goods and should be removed by a light scour.

On the basis of the wash tests carried out it is obvious that those colors which are not fast on unchlorinated wool are much less fast on chlorinated wool and, therefore, unsatisfactory. On the other

Table XIX

Strength and Shade Evaluations of the Dyed Material
Strengths have been evaluated on the basis of *100* for the Untreated Fabric (A)

Color	*Fabric A*	*Fabric B*	*Fabric C*	*Fabric D*	*Fabric E*	*Fabric F*
	Strength	*Strength*	*Strength*	*Strength*	*Strength*	*Strength*
Calcocid Yellow 2G	100	95	100	95	95	95
Calcocid Orange Y	100	95	100	95	90	95
Calcocid Aliz. Red RR	100	100	100	100	95	95
Polar Yellow 2G	100	100	100	95	90	95
Acid Milling Red R Conc	100	100	102	100	100	100
Novazol Blue B	100	100	100	100	90	97
Neolan Yellow GR Conc	100	105	100	87	95	105
Neolan Pink BA	100	100	100	90	100	105
Neolan Blue 2G	100	107	100	90	100	100
TOPCHROMED						
Chromosol Yellow C Conc	100	95	95	95	90	105
Omega Chrome Brown PG	100	100	100	100	100	95
Omega Chrome Brown EB Conc	100	95	95	95	90	100
Omega Chrome Brill. Blue B	100	100	100	95	100	100
METACHROMED						
Chromosol Yellow C Conc	100	90	100	95	90	95
Omega Chrome Brown PG	100	100	100	95	100	100
Omega Chrome Brown EB Conc	100	95	95	95	95	95
Omega Chrome Brill. Blue B	100	100	100	95	100	100
Algosol Yellow GCA	100	100 Sl. redder	100 Tr. redder	97 Sl. redder	97 Same	97 Redder, duller
Algosol Pink IR Supra	100	100 Tr. bluer	100 Tr. yellower	95 Tr. yellower	90 Duller, yellower	102 Tr. yellower
Algosol Blue O4B	100	100 Sl. br., redder	105 Tr. br., greener	95 Duller, greener	90 Duller, greener	97 Sl. duller, greener
Algosol Green IBW Paste	100	95 Yellower, brighter	105 Sl. yellower	90 Brighter	105 Yellower	90 Yellower
Algosol Olive Green IB-CF	100	110 Br. yellower	97 Duller, redder	100 Sl. yellower	103 Sl. brighter, yellower	100 Yellower, duller
Algosol Brown IBR-CF	100	115 Br., redder	95 Sl. duller, greener	112 Brighter, redder	107 Sl. brighter, redder	100 Sl. brighter yellower
Vat Orange R Paste	100	105 Sl. yellower	105 Much yellower	95 Sl. redder	100 Sl. redder	105 Sl. yellower
Vat Red Violet RN Paste	100	130 Much yellower	100 Same	100 Yellower, brighter	115 Much yellower	110 Much yellower
Brilliant Indigo 4BR Paste	100	140 Much redder	105 Sl. redder	100 Sl. redder, brighter	130 Very uneven	105 Sl. brighter
Vat Brown G Paste	100	130 Much yellower, brighter	105 Much yellower, brighter	100 Much yellower	100 Much redder, uneven	105 Sl. yellower, brighter

Sl.—Slightly. Tr.—Trace. Br.—Brighter.

hand, those colors that are fast on untreated material show only a slight loss, if any, on material chlorinated by either an acid or an alkaline chlorination.

Light Fastness

Fadeometer exposures were made on 0.25% and 1% dyeings of the acid milling, metallized and chrome dyes, 0.25% dyeings of solubilized vat dyes and 1.5% and 6% dyeings of vat dyes until a "break" or "fade" was visible. In the case of the vats the exposure was not extended to over 200 hours.

No attempt was made to rate or assign ratings since differences were slight and followed no particular pattern as to dye class or treatment.

In the case of the solubilized vat dyes a rather interesting observation was made, namely, that while the untreated material had faded slightly yellowish and duller after 160 hours in the Fadeometer, all of the chlorinated fabrics had become brighter and some even appeared slightly stronger than before exposure.

Summary

The dyeing characteristics of a standard woolen flannel was compared with pieces of the same flannel that had been treated by representative aqueous chlorination methods. It has been shown that the rate of dyeing of acid, milling, metallized, chrome and soluble vat dyes, especially

Table XX

Wash Fastness of Dyestuffs on the Various Materials

The Wash Fastness has been rated on a Basis of 5–0, 5 representing very good to excellent and 0 complete loss of color.

Color	Fabric A Washings			Fabric B Washings			Fabric C Washings			Fabric D Washings			Fabric E Washings			Fabric F Washings		
	1	3	5	1	3	5	1	3	5	1	3	5	1	3	5	1	3	5
Calocid Yellow 2G	2–3	1	1	1	0	0	2	0–1	0–1	1–2	0–1	0–1	1–2	0–1	0–1	1–2	0	0
Calocid Orange Y Ex. Conc.	2	0–1	0	1	0	0	2	0–1	0	1–2	0–1	0	1–2	0	0	1–2	0	0
Calcocid Alizarine Red RR	3	2	1–2	1	0–1	0	3	1–2	1	2	1	0–1	1–2	0–1	0–1	2	0–1	0
Polar Yellow PG Conc.	3	2	1–2	2	0	0	3	2	1–2	2–3	1–2	1	1–2	1	0	2	1	0
Acid Milling Red R Conc.	4	3–4	3–4	3–4	2–3	2–3	4	3–4	3–4	3–4	3	3	2	1	1	3–4	3	3
Novazol Blue B	3–4	3	3	2–3	1–2	1–2	4	3–4	3–4	3	2–3	2–3	2	1–2	1	3	2	2
Neolan Yellow GR Conc.	4–5	4	3–4	3–4	3	2–3	4–5	4	3–4	3–4	3	3	3	2	1–2	4–5	3–4	3
Neolan Pink BA Y	4	3–4	3–4	3–4	2–3	2	4	3–4	3	4	3	3	3	1–2	1–2	4	2–3	2
Neolan Blue 2G	3–4	3–4	3	3–4	3	2–3	3–4	3–4	3	3–4	3	2–3	3	2	1–2	3–4	2–3	2
Topchromed																		
Chromosol Yellow C Conc.	4–5	4	4	4–5	4	4	4–5	4–5	4–5	5	4	4	4–5	3–4	3	4–5	4	4
Omega Chrome Brown PG	4–5	4	4	4	3–4	3–4	4–5	4–5	4–5	4	3–4	3–4	3–4	2–3	2–3	4	3–4	3–4
Omega Chrome Brown EB Conc.	4–5	4	3–4	3–4	4	3–4	4–5	3–4	3–4	5	3–4	3–4	4	3	3	4–5	3–4	3–4
Omega Chrome Brill. Blue B	5	4–5	4	4–5	4	3–4	4–5	4	3–4	5	3–4	3	4–5	4	3–4	4–5	4–5	4
Metachromed																		
Chromosol Yellow C Conc.	4–5	4	4	4–5	4	4	4–5	4–5	4	4–5	4–5	4	4–5	4–5	4	4–5	4–5	4
Omega Chrome Brown PG	5	4–5	4–5	3–4	2–3	2–3	4–5	3–4	3–4	4–5	4	4	4	3	2–3	4	4	4
Omega Chrome Brown EB Conc.	5	4–5	3	4–5	3–4	3–4	4	3–4	3–4	5	4	4	4–5	3	3	4–5	4	3–4
Omega Chrome Brill. Blue B	5	4–5	4–5	4–5	4	4	4–5	4	4	4–5	4–5	4	4–5	4–5	4	4–5	4–5	4
Vat Orange B Paste	5	5	4–5	4–5	4–5	4–5	5	5	5	5	5	4–5	4–5	4	4	5	4–5	4–5
Vat Red Violet RR Paste	4–5	4–5	4	4	3–4	3–4	5	4–5	4–5	4–5	4	4	4	3–4	3	4–5	4–5	4
Brilliant Indigo 4BR Paste	4–5	4–5	4	4	3–4	3	4–5	4–5	4	4	3–4	3	4	3	3	4	4	3–4
Vat Brown G Paste	4–5	4–5	4	4	3–4	3	5	4–5	4–5	4	3–4	3–4	4	3–4	3	4–5	4	4
	Washings			*Washings*			*Washings*			*Washings*			*Washings*			*Washings*		
	1	5	10	1	5	10	1	5	10	1	5	10	1	5	10	1	5	10
Algosol Yellow GCA	4–5	4	4	4–5	4	4	4–5	4–5	4–5	4–5	4–5	4–5	4	4	4	4–5	4–5	4
Algosol Pink IR Supra	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4	4	4–5	4–5	4–5
Algosol Blue O4B	4–5	4–5	4	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4–5	4	4	4	4–5	4–5	4
Algosol Green IBW Paste	4	3–4	2–3	4	3–4	3	4–5	4	4	4	3–4	3	3–4	3	2	4	3	2–3
Algosol Olive Green IB-CF	4–5	4	4	4–5	4	3–4	4–5	4–5	4–5	4–5	4–5	4–5	4	3–4	3	4–5	4–5	4
Algosol Brown IBR-CF	4–5	4	3–4	4–5	4	3–4	4–5	4–5	4	4–5	3–4	3	4–5	3	3	4–5	4	3–4

during the initial stages, is influenced to a pronounced degree by the various chlorination processes. It has also been shown that the final shade and strength obtained is dependent upon the treatment. The treatments did not affect the light fastness of the dyes used in this investigation, whereas the wash fastness, especially of the acid, milling, and to a lesser degree the metallized dyes, was affected by the various treatments.

It is the hope of the Committee that the information in this article will be used as the basis for future research. As the demand for washable woolens increases, the demand for faster dyes will also increase. Such demands will be satisfied only when the dye manufacturers, the proponents of the treatments, and the textile mills are determined to embark on a cooperative program that will be mutually beneficial.

Acknowledgment

The Committee acknowledges with thanks the excellent cooperation given by the following companies and their associates.

Alrose Chemical Co., Providence, R. I.

Botany Mills Inc., Passaic, N. J.

Calco Chemical Div., American Cyanamid Co., Bound Brook, N. J.

Ciba Co., Inc., New York.

Cluett Peabody Co., Troy, N. Y.

E. F. Drew & Co., Boonton, N. J.

Forstmann Woolen Co., Passaic, N. J.

Geigy Co., Inc., New York.

General Dyestuff Corp., New York.

National Aniline Div., Allied Chemical & Dye Corp., New York.

Sandoz Chemical Works, New York.

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Everett E. Smythe—Overseer of Dyeing, Jamestown Worsted Mill, Jamestown, N. Y. Sponsors: H. E. Wieland, W. H. McGuire.

William F. Thompson—Chemist, Clearwater Finishing Co., Clearwater, S. C. Sponsors: T. T. Wilheit, H. G. Smith.

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Dutt Co., Inc., Philadelphia, Pa. Sponsors: J. W. Barton, E. R. Beigbeder.

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Curt G. Vogt—Consultant Chemist, Union N. J. Sponsors: H. F. Herrmann, J. R. Bonnar.

Neville A. Whiffen—Officer in Charge, Australian Embassy Scientific Liaison Office, Washington, D. C. Sponsors: M. Harris, W. D. Appel.

Hazel L. Whittle—Asst. Supt., Gregg Dyeing Div., Graniteville Co., Graniteville, S. C. Sponsors: S. Converse, R. P. Timmerman.

Albert G. Willard—Foreman, Rayon Div., North Carolina Finishing Co., Salisbury, N. C. Sponsors: W. Harrington, Jr., J. C. Thomas.

Arthur R. Williams, Jr.—Textile Chemist, E. I. du Pont de Nemours & Co., Inc., Atlanta, Ga. Sponsors: M. S. Williams, Jr., A. Fisher, Jr.

Carl F. Wittichen, Jr.—Pres., Wittichen Chemical Co., Inc., Birmingham, Ala. Sponsors: J. A. W. Richardson, A. Kempton Haynes.

Malcolm R. Woodward—Research Chemist, Colgate-Palmolive-Peet Co., Jersey City, N. J. Sponsors: J. A. Woodhead, J. H. Skinkle.

Charles A. Young—Research Chemist, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Sponsors: M. S. Whelan, E. C. Buxbaum.

John A. Zelek—Dyestuff Plant Mgr., Interchemical Corp., Fair Lawn, N. J. Sponsors: W. W. Chace, H. L. Young.

Hans H. Zweifel—Vice-Mgr., Ciba Ltd., Basle, Switzerland. Sponsors: R. C. Geering, E. Young.

JUNIOR

Rufus P. Anthony, Jr.—Chemist, Burlington Mills, Cramerton Div., Cramerton, N. C. Sponsors: B. G. Zimmerman, M. B. Hart.

Helen C. Barry—Scientific Aide, South. Reg. Research Lab., New Orleans, La. Sponsors: W. B. Strickland, R. K. Worner.

Robert P. S. Black—Chemist, E. I. du Pont de Nemours & Co., Inc., Deepwater, N. J. Sponsors: W. W. Pennock, W. H. Zillessen.

William M. Bonner—Salesman, National Starch Products, Atlanta, Ga., Sponsors: S. J. Davis, C. Russell Gill.

Edmund M. Buras, Jr.—Chemist, Southern Regional Research Lab., New Orleans, La. Sponsors: W. Norbert Berard, W. B. Strickland.

Meeting Dates, Philadelphia Section

THE following dates have been added to the meeting schedule of the Philadelphia Section:

September 24th, 1948.
November 12th, 1948.
January 28th, 1949.

All meetings will be held at Kugler's Restaurant in Philadelphia.

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Council and Research Committee Meetings

THE next meeting of the Council and Research Committee will be held on Tuesday, June 8th, rather than on June 11th as previously announced. The meetings will be held in New York City and sub-committee meetings will be held the day before, June 7th.

—♦ ♦—

Spring Meeting, Mid-West Section

THE spring meeting of the Mid-West Section will be held at the Hotel Schroeder, Milwaukee, Wisconsin, on Saturday, May 1.

This meeting promises to be of special interest to all. Papers will be presented at both the afternoon and evening sessions on subjects of prime interest to the present-day textile field.

The afternoon session, starting promptly at 2:30 P.M., will be highlighted by the introduction of Dr. H. Luttringhaus of General Dyestuff Corporation, who will speak on the "Influence of Chlorine on the Dyeing of Wool." There will be an opportunity for general discussion.

Dinner will be served promptly at 7:00 P.M.

The evening speaker will be H. F. Clapham of E. I. duPont de Nemours and Company, Inc., whose subject will be "The Dyeing of Spun Nylon, Filament Nylon and Nylon-Wool Mixtures."

Technical Program Augusta Convention—October 21-23

Persons desiring to contribute papers for the Technical Program or who have suggestions for desirable topics and authors should advise Dr. Miles A. Dahlen, Room 8518, Nemours Building, Wilmington, Delaware, as soon as possible.

See page P183, March 22nd issue, for details of the technical program.

CALENDAR

PHILADELPHIA SECTION
Meetings: April 9, May 14 (Kugler's, Philadelphia); Outing: June 11 (Atlantic City Country Club, Northfield, N. J.).

MID-WEST SECTION
Meeting: May 1 (Hotel Schroeder, Milwaukee, Wis.).

NEW YORK SECTION
Meeting: May 7 (Swiss Chalet, Rochelle Park, N. J.); Outing: June 25 (North Jersey Country Club).

PIEDMONT SECTION
Meeting: June 18 (Ocean Forest Hotel, Myrtle Beach, S. C.).

NORTHERN NEW ENGLAND SECTION
Meetings: April 16 (Lowell Textile Institute); May 21, June 11 (Outing); September 24 (Andover Country Club); November 19.

SOUTHEASTERN SECTION
Meetings: July 24 (Atlanta, Ga.); September 25 (Columbus, Ga.); December 4 (Atlanta, Ga.).

SOUTH CENTRAL SECTION
Meeting: April 10 (Patten Hotel, Chattanooga).

LTI STUDENT CHAPTER
Meeting: April 16.

SUB-COMMITTEES
Meeting: June 7 (New York).

COUNCIL
Meeting: June 8 (New York).

RESEARCH COMMITTEE
Meeting: June 8 (New York).

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

48-2

Education: B.S., R. I. State College.
Experience: General chemical and testing; laboratory and plant development of methods for applying dyes and textile specialties.
Age 37; married; references.

48-3

Education: B.S., with graduate work; fair knowledge of languages.
Experience: Textile chemical research, cotton dyeing, printing and finishing.
Age 26; woman, unmarried; references; vicinity of New York or Philadelphia preferred.

48-4

Education: Graduate, Philadelphia Textile Institute.
Experience: Testing dyes, etc.; chief chemist, in charge of mercerizing, bleaching and dye formulas.
Age 47; married; references; vicinity of Philadelphia preferred.

Book Reviews

Modern Polishes and Specialties

By W. D. John, B. Sc., M.A. Consulting Industrial Chemist. 313 pages. Price $7.50. Published by Chemical Publishing Co., Brooklyn, N. Y.

During the past twenty-five years great headway has been made in the number and variety of chemical specialties and polishes for use in the home and also in industry, for maintaining the cleanliness, luster and brightness of metals, wood and other construction materials.

Early manufacturers of polishing material depended, almost if not entirely, on the empirical method and the process of trial and error, but in recent years, experienced chemists are employed in the scientific compounding of such products, and much research involved which has led to great improvements of the products available.

More than 700 practical and successful developed formulas are given, with method of preparation, manufacturing details and other technical data, most of which are the result of the author's long experience and actual laboratory and industrial experiments.

Chemists, technicians, executives, and salesmen engaged in the polish and specialty business will welcome this practical volume. Students who plan to enter these fields either as chemists or manufacturers will find this book very useful.

1947 A.S.T.M. Standards on Textile Materials (With Related Information)

Published by A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa. Price $4.00.

The 1947 edition of the compilation of A.S.T.M. Standards on Textile Materials, With Related Information, gives in the latest approved form the some 85 specifications, tests, tolerances, definitions and terms on a wide range of textile materials. This 530-page book includes in addition to the standards, considerable other related information, and data on A.S.T.M. Committee D-13, which sponsors the publication each year. The first section relates to general methods and specifications covering such subjects as the following: definition of terms relating to textile materials; identification of fibers; fastness to light; fire-retardant properties; resistance to insects; etc. The sections following cover asbestos; bast and leaf fibers; cotton (about 100 pages) glass textiles; rayon and silk; and wool. Several proposed methods are detailed that have not been approved, but comments and criticism are invited. Some of these are accelerated aging, estimating the clean wool content in wool in the grease, evaluation of properties related to the hand, specification and test for fire-retardant properties of treated felt.

The book also includes data on basic properties of fibers, yarn number conversion table, and table for relative humidity. In the section involving papers, there are two contributions which cover, "A Stress-Strain Tester for Textiles Employing a Magnetic Strain Gage" by J. W. Ballou, and the other "Measurement and Elimination of Inertia Effects in Textile Testing Equipment by Means of Electric Strain Gages" by Herbert F. Schiefer.

Vat Dyestuffs and Vat Dyeing

By M. R. Fox. Full Technological Certificate, Dyeing of Textiles, City and Guilds of London Institute; Technical and Research Staff, L. B. Holliday and Co., Ltd., Huddersfield, England. Member of the American Association of Textile Chemists and Colourists. 323 pages, 29 figures. Price $5.50. Published by John Wiley and Sons, Inc., 440 Fourth Avenue, New York City.

During the past few years, the whole subject of dyes and their application, has grown with great rapidity and with the advent of so many new fibers, has become so complicated, that no one person can attain the standing of an authority on the detail of the whole industry. It therefore seems proper that a book should be published dealing solely with the vat dyes, which in many respects constitute one of the most important groups of present day dyes.

The present book is divided into the following chapters:

I Indigo and Related Dyes.
II Anthraquinoid Vat Dyes.
III Introductory to Application.
IV Properties of Vat Dyestuffs.
V Application—Animal Fibers.
VI Application—Cellulosic Fibers.
VII Application—Indigosol Dyestuffs.
VIII Application—Pigment Padding and Miscellaneous Processes.
IX Printing and Discharging.
X Machinery.
XI Non Textile Uses of Vat Dyes.
XII Identification of Vat Dyestuffs.
XIII Analogous Dyestuffs.
Appendix I. Index of Dyestuffs Listed in Chapter XIII.
Appendix II. Current Literature.
Appendix III. Index to Formulae.

Incorporated in this volume is a large number of correlated practical facts which have been collected during the author's ten years experience with vat dyestuffs. Despite this experience however, the author does not claim to be an expert in all branches of their application. Where aspects of the subject have been described in detail elsewhere, suitable references have been included in the text.

Both the student, and the user of vat dyestuffs can gain much knowledge from this book, and much time may be saved from the tedious search through the literature, which has already been accomplished by the author. It is interesting to note that a very large proportion of the references to current literature in Appendix II are from the Proceedings of the AATCC.

While the well versed American reader may find some variation from our procedure of process, machinery, and dye nomenclature, these are of minor importance as compared with the overall value of the book.

Encyclopedia of Chemical Technology

Edited by Raymond E. Kirk, Head of Department of Chemistry, Polytechnic Institute of Brooklyn, and Donald F. Othmer, Head of Department of Chemical Engineering, Polytechnic Institute of Brooklyn; Assistant Editors: Janet D. Scott and Anthony Standen. Ninety-three contributors are listed. Vol. 1, 981 pages with numerous figures and tables. Price $20.00. Copyrighted by The Interscience Encyclopedia, Inc., New York. Distributed by the Interscience Publishers, 215 Fourth Ave., New York 3, N. Y. 1947.

With the advent of the Encyclopedia of Chemical Technology, we have the first real attempt at an American chemical publication of the scope and completeness worthy of the name of an encyclopedia. The present work will be com-

pleted in ten volumes of approximately 960 pages each, and at the rate of two to three volumes per year.

The chemical industry of the U. S. during this first half of the 20th century has developed from one of relatively minor importance to that of an unquestionable world leader. As a result the number of American chemists has greatly increased and an entirely new profession, that of the chemical engineer, has come into existence.

In addition to this great development in the chemical industry itself, many new industries have come into existence which depend either directly or indirectly upon fundamental chemistry and chemical engineering, hence there has been a growing demand for accurate and up to date chemical information. Throughout the chemical and engineering journals, and the patent literature there is of course a vast amount of valuable information, to say nothing of the great number of books which have been published upon individual branches of the industry but the diffuseness, and indeed the abundance of industrial chemical literature, have made it difficult to obtain needed information readily. The editors have long been familiar with the great need for an encyclopedia of chemical technology written in English and representing modern American practice and chemical engineering. These volumes have been prepared in an effort to meet this need.

According to the authors' preface, the work has been organized as a specialized encyclopedia. It is neither a dictionary nor a handbook, nor is it a series of technological monographs which deal with relatively narrow aspects of subjects for the benefit of advanced specialists in these fields. Rather it is designed to present the entire field of chemical technology for professional chemists and chemical engineers who may wish to know the methods which are employed in a special field, often outside of their immediate experience.

The subject matter is descriptive of technologically important materials, methods, and phenomena. It is not primarily theoretical and mathematical except insofar as such treatment is necessary to bring out well established principles and will give a background which will enable the user to understand and apply the information given.

The policy followed by the editors in preparing the encyclopedia has been to have all articles written by authorities in each field; each article has then been reviewed by one or more specialists in organizations other than those represented by the contributors.

It is the aim of the editors to give a balanced account of each subject avoiding biased remarks about particular products or processes, and to exclude controversial and hypothetical material. Preference has been given to American practices but if a foreign practice seems to offer advantages of general interest, deviations from American practice have been mentioned and the reasons for these deviations explained. Where several methods are in use for manufacturing the same product the intention has been to treat with greatest detail the most usual or efficient one.

Great care will be taken as to the nomenclature which will be followed throughout all the volumes. Several pages of explanatory statements regarding the system used, have been inserted at the beginning of Volume I, with a complete list of all abbreviations used. We presume that this will be published in each volume.

The thoroughness with which each subject has been considered leads one to wonder if the ten volumes will suffice to cover the whole field, since Volume I by no means finishes with the first letter of the alphabet. For instance 80 pages are devoted to the alcohols, 70 to alkalis and chlorine, 50 to the alkaloids and 40 to analytical chemistry, all four very important subjects, but constituting one fourth of the whole volume.

A casual reading of articles here and there throughout the book confirm all that has been stated by the editors in their preface and introduction. We believe that this book will be received enthusiastically by all professional chemists and chemical engineers. For many years the discussion has gone on as to whether a chemical engineer was a chemist who knew something about engineering, or an engineer who knew something about chemistry. The answer to this question however will have no bearing on this Encyclopedia of Chemical Technology, for in either case the books will be extremely valuable.

Varnished Cloths for Electrical Insulation

By H. W. Chatfield, Ph. D., Chief Varnish Research, Chemist, Jenson and Nicholson, Ltd. and J. H. Wredden, Process Development Chemist, Igranic Electric Co. 233 pages. 62 figures. 46 tables. Price $6.00. Published by Chemical Publishing Co., Brooklyn, N. Y.

This book should be of value to the textile manufacturer in that it tells him of some of the processes his fabrics will have to undergo after they leave his hands.

Varnished fabrics are extensively used for insulation. The properties demanded of them are extremely exacting, and much skill is required in their manufacture.

The authors have brought together under one cover much valuable information, which was heretofore scattered throughout technical and trade literature.

The authors describe the properties of the fibers, particularly cotton and viscose rayons, also silk and glass, which are adaptable to the manufacture of insulating fabrics. They discuss with considerable detail the properties required of such fabrics after completion, and describe the methods of testing used for determining their suitability for the purposes intended, and the conditions under which they will be used.

Best's Safety Directory for 1948

2nd Ann. Ed. Price 5.00. Reduced Rate in Quantity. Published by Alfred M. Best Co., 75 Fulton St., New York 7, N. Y.

Best's Safety Director for 1948—covering the entire field of Safety, Fire Protection and Control, Hygiene, First-Aid and Sanitation—is now available to industry, as recently announced by the Alfred M. Best Company's Safety Engineering Division.

The Directory is unique in that it combines all the best practical features of a Safety Manual, Directory, Index, Encyclopedia and Catalog into one comprehensive, profusely illustrated, 494-page volume. It is the *"What, How* and *Where* Book of Safety"—showing *what* safety products or devices to use for specific hazards; *how* to use them; *where* to get them. Best's was the first Safety Directory published and is still the only one in the field.

This book is of special interest to company safety directors, safety engineers and production men, also among such diverse groups as financial and corporation executives; insurance agents, executives and safety inspectors; purchasing agents; industrial hygienists and medical personnel; public health and safety officials; chambers of commerce; schools and colleges. Industries represented by these groups are even more diverse.

The publishers point out that the new book shows a 50 per cent increase over the last edition in actual content. In addition, almost complete editorial changes and rearrangements have been made.

One outstanding feature of this book is its indexing and subject-grouping system. These devices—plus countless illustrations—make it easy to locate safety products even when the user is not certain of the type or name of the product he needs. The logical arrangement of subjects also serves as a checklist of hazards—many of which are frequently overlooked. Typical sections are *Arm and Hand, Body and Leg, Eye and Face, Fire,* etc.

ABSTRACTS

Naphthol Dyeing, Past and Present

Francis Tripp, Textile Bulletin, page 79, Vol. 74, No. 2, February, 1948.

The first patent on dyeing cotton piece goods with naphthol colors was issued in England in 1881 and covered the dyeing of Para Red which was obtained by impregnating cotton fabric with an alkaline solution of beta-naphthol, drying the fabric and passing it through a developing bath of diazotized paranitroaniline base. Naphthol AS was produced in 1912 but it was nearly ten years before it was used in combination with Fast Red G Base. Other naphthols were produced shortly afterwards.

The procedure in the dyeing of naphthol colors consists of impregnating the fabric with a solution of the naphthol, drying, and coupling by passing the fabric through a solution of a diazotized base or salt. Originally only bases were known and required skillful handling but later fast color salts, which are diazotized bases in powder form, were brought out.

Some naphthols are substantive to a high degree and others to a lesser degree. Non-substantive naphthols are applied to the fabric by padding through a two or three-roll mangle, drying, and then passing through a solution of the diazotized color base or fast color salt. Naphthols of high substantivity are best applied on the jig. Developing, or coupling is carried out cold. The excess of color lake formed should be kept in a fine suspension so it may be rinsed off the fabric in a subsequent washing operation.

The one real fault of naphthol colored fabric, not properly dyed or aftertreated, is its tendency to crock. A good aftertreatment consists of a good soaping with all the agitation possible.

A practical dyeing formula is given.

Textile Screen Printers and Pigment Colors

Georgia W. Leffingwell and Olive-Sue Linkletter, Rayon Textile Monthly, page 89, Vol. XXIX, No. 2, February, 1948.

Pigmented emulsion colors especially designed for textile screen printing are being introduced. The paste is composed of resins dissolved in solvent and emulsified with water. After application the solvents and water evaporate leaving the resins and pigment on the cloth. Heating converts the resin to insoluble particles which bind the pigments firmly to the fibers. There is no need for a thorough washing operation.

The proper production of the silk screen itself is an essential prerequisite for high quality silk screen printing. Specially formulated block-out material is available which provides particularly good resistance to wear for long runs of a pattern. A popular type of screen is the film stencil, which is composed of two layers, a shellac or lacquer film over a supporting piece of glassine paper. Information concerning the use of the film stencil is given. The photo stencil is one of the best methods of stencil making for long runs or for fine-line designs and information concerning it is given.

Good preparation of the fabric before screen printing is essential and sized materials should be desized. The preparation will influence to a considerable degree the penetration, shrinkage and hand of the print.

A number of typical illustrations of prints is given.

Modern Textile Chemicals

Francis Tripp, Textile Bulletin, page 70, Vol. 74, No. 1, January, 1948.

The application of the modern textile chemical specialties has resulted in imparting undreamed of qualities to finished goods and their application during the wet finishing processes has resulted in much greater efficiency during the scouring, bleaching and dyeing operations.

There is considerable discussion regarding the use of surface-active compounds and enzymes.

Patent Monopoly in Chemical Industry

R. S. Jane, Canadian Chemistry and Process Industries, page 37, Vol. 32, No. 1, January, 1948.

Much of the misunderstanding of the patent system and its association with monopolies and cartels originates in the erroneous notions that many people have with regard to patents. There is a lack of clear understanding of the nature of the patent monopoly and the reasons for granting a monopoly to the discoverer or a new product or process.

A patent is the means by which an inventor's right in an invention is made secure or confirmed. Without a patent he has the right to his own creation but is helpless to protect his invention against appropriation by others except by concealment. To obtain a patent, the inventor first discloses his invention but later, upon expiration of the term of the patent, it becomes free to be used by anyone who so desires. The patent provides an incentive to invent.

If industry does not have the means of protecting its investment in research that is afforded by patents only a fraction of the money now spent on research would be appropriated. Many industries have had their origin in the incentive created through patent protection. Chemical industry as we know it today would not exist had there been no patent system to protect the capital invested, particularly in the early stages of the development. It is the author's opinion that, if the patent system were abolished, we would soon return to the old system of secret processes carried out behind closed doors and industrial espionage would soon be rife. Technically trained men would lose most of the freedom they now enjoy as the employer would certainly demand a rigid contract to prevent the employees from taking secrets elsewhere. Developments that were not readily amenable to secret operation would not be attempted and no scientific information of value to others would be published.

A company which develops a basic material usually takes out patents in all of the important industrial countries and then licenses other manufacturers in these countries to produce and supply the product to fulfill local demand.

Expansion involving a number of companies in a given field frequently leads to cross-licensing arrangements on both past and future patented developments. This procedure facilitates and stimulates research, prevents unnecessary duplication of effort, speeds up commercial development, and avoids expensive and time-consuming litigation.

It is the author's opinion that it is impractical to deal with patents by anti-monopoly legislation for the reason that the granting of a patent is in its very essence the granting of a monopoly by the state itself. The public is invariably on the receiving end whenever a patent is issued and subsequently placed under license. In exercising the patent monopoly the company is not taking anything away from the public that it had before the monopoly was granted. The public is being given something it never enjoyed before, in the form of new processes, new products and frequently new wealth.

It is frequently said that a patent gives a company or an individual the

power to charge exorbitant prices for a commodity without fear of competition. Practically, this is a short sighted policy rarely indulged in by progressive corporations as there is no more certain method of inviting competition than by over-pricing.

Those who would destroy the patent system have based their attitude on misinformation and a complete lack of knowledge of the mechanism of industrial progress based on research and development.

Simple Procedure Governs Care of Resins

Richard E. Sumner, page 133, Textile World, Vol. 98, No. 1, January, 1948.

The basic procedure for the storage and handling of resins consists of the following three steps:

(1)—Examine and test one drum of each batch of resin as soon as it reaches the plant.

(2)—Keep only a thirty-day supply on hand. The first lot of any given resin which is put into stock should be the first used.

(3)—Keep all resins in cool storage, 40° to 50° F. Excessive heat will quickly ruin most textile resins and freezing will also injure many of them.

Specific information regarding the care and handling of thermosetting and thermoplastic resins is given.

It is pointed out that chemical manufacturers furnish the mills with all of the available information, not only on the processing characteristics of their products, but also on their stability in storage.

Procedure for Obtaining Patents

Paul B. Eaton, page 97, Textile Industries, Vol. 111, No. 12, December, 1947.

With regard to an invention that is thought to be new and useful, it is recommended to have a patent attorney make a search in the patent files of the U. S. Patent Office to determine if this is so. The same procedure is advised with regard to the use of a specific trade name. If a possible invention has not been fully developed, it is best to reduce it to practice as early as possible. A complete record book with full information and details should be kept. After an application for patent has been filed, at least one year is required for the patent to be issued but meanwhile the invention may be used and licenses or other rights to it may be sold. Only an individual may apply for a patent and must be the real inventor or inventors. The patent or an interest in it may be assigned. With regard to trademarks, goods under the proposed trademark must have been shipped in interstate commerce prior to the date of application for its registration. Considerable information regarding copyrights is also given in the article.

Dyeing Properties of Indian Cotton

D. L. Sen and Nazir Ahmad, The Indian Textile Journal, page 34, Vol. LVIII, No. 685, October, 1947.

A study has been made of the dyeing properties of twelve varieties of Indian cotton of different growth, using five substantive dyes of varying molecular weights.

It was found that, although there is a variation in the dye absorption of the cottons tested, the maximum variation is not great. In general, there is more dye absorbed in fine cottons than in the coarse. Dye absorption decreases with increasing molecular weight.

Soda boiling tends to lessen the dye absorption whereas kier boiling with alkali increases the dye absorption of cotton. It was determined that irrespective of the nature of substantive dyes, the dye absorption per unit length of cotton fiber increases with the increase in fiber weight of cotton fiber.

The test methods used in this study and the experimental data are given in detail.

Location of Melamine Resin in Treated Wool Fibers

Fred T. Marshall and Sarah J. Aulabaugh, Textile Research Journal, page 622, Vol. XVII, No. 11, November, 1947.

A dye-staining method for determining the location of melamine resin applied to wool fibers has been developed and is described in this paper.

Using Aqua Plastic Red under the conditions outlined, the melamine resin will be stained but not the untreated fiber. Microscopic examination of resin treated and untreated wool fibers stained by this method indicate that the resin is distributed uniformly within the fiber structure. It is noted that this method is qualitative and no more than rough estimations can be made of the amount of resin present.

Laboratory Machine Gives Data on Continuous Dyeing

C. L. Zimmerman, Textile World, page 116, Vol. 97, No. 12, December, 1947.

A laboratory apparatus for the study of continuous dyeing such as takes place in a Williams Unit has been developed. Although not a small scale model of the Williams Unit, its design allows the simulation of the conditions of time of immersion and the cloth-dye-bath ratio.

The laboratory unit has been used for shade matching with direct, vat and sulfur dyes. In addition it has been used for the solving of many application problems such as finding the amount of caustic soda and hydrosulfite required in dyeing, the effect of varying the time of immersion, etc. The results obtained with this unit have been found comparable to those obtained on plant machines.

The dyeing unit consists of two Monel sections which are used in conjunction with a laboratory padder. Its simplicity and ease of operation makes this apparatus highly desirable for the study of continuous dyeing.

Pepperell's Opelika Bleachery

Textile Industries, page 113, Vol. 111, No. 10, October, 1947.

The new bleachery located at the Opelika (Ala.) Division of Pepperell Manufacturing Company was constructed to bleach, dye and finish grey goods into sheets and pillow cases as well as to handle fabrics from the Opelika and Lindale divisions that are to be dyed and finished.

Material flow through the plant is a straight line, continuous process with the goods entering the plant at the end nearest the weaving mill and progressing through the bleachery to either dyeing or finishing and thence to the sheet and pillow case factory located on the second floor. A continuous dyeing range is used which is said to be the first of its kind constructed in any plant.

Modern equipment is used throughout the plant and much of it is illustrated in the article by means of photographs.

Highly Concentrated Hydrogen Peroxide: Physical and Chemical Properties

Edward S. Shanley and Frank P. Greenspan, Industrial and Engineering Chemistry, page 1536, Vol. 39, No. 12, December, 1947.

The physical properties of highly concentrated (90%) hydrogen peroxide are summarized with particular reference to its stability and stabilization, oxidizing properties, and its use in polymerization reactions.

The hazards involved in the handling and storage of concentrated hydrogen peroxide are discussed in detail. Three-phase diagrams are included which show the explosive range of acetone-peroxide-water, ethanol-peroxide-water, and glycerol-peroxide-water mixtures.

• PATENT DIGEST •

PAUL WENGRAF

Discharge Prints on Wool, Preparing with Formaldehyde Solutions D, 2, 02

Brit. P. 589,193
(Bleacher's Assoc., Schwabe, Parker, Farrington, June 13, 1947)

It is well known that sulfur dioxide has a strong effect on animal fibers. This reaction might even go so far as to degrade the fiber substance by attacking the disulfide bonds of the wool molecules. It is further known that by the action of formaldehyde the attacks, especially alkaline attacks on the fiber material, can be partly prevented. It has now been discovered that this protective action, obtained in the formaldehyde pre-treatment, has also a good effect in discharge prints on wool. This effect can be characterized thereby that SO_2 liberated acts as a discharging agent. This treatment can take place before or after drying the dyed fabrics. For example the dyed goods are impregnated in a bath of formaldehyde and sulfuric acid and subjected to a temperature of 130° C. for 15 minutes. The composition of this bath is: 200 ml. formaldehyde (40%) and 0.8 ml. concentrated sulfuric acid in 4 liters. The pH was found to be 1.8 at 20° C. The fabric is printed with a regular reducing discharge and subsequently aged, washed and dried.

References: U. S. Pat. 2,222,526, 1940 (Block-Cabble) protected a process for stripping dyeings by using formaldehyde, combined with hydrosulfite in stripping liquids. U. S. Pat. 1,972,137 (Celanese) proposed to prepare the fabrics with a non-volatile agent before printing reductive discharge pastes. A different method for preventing alkali sulfide formation in reductive discharge processes consists of adding monochloracetates to the printing pastes according to Haller-Ciba's U. S. Patents 2,024,038 and Ger. P. 621,578.

Dyeing Cellulose Acetate, Different Classes of Dyestuffs C, 4, 07

Brit. P. 589,245
(Textron, Inc., June 16, 1947)

Dyeing of acetate of cellulose is generally carried out with the usual water insoluble special acetate dyestuffs. It has now been discovered that also other dyestuff groups for instance acidic, basic or Indigosol dyes can be used for this fiber under special conditions. Another Brit. P. has already been granted the same company teaching to dye acetate of cellulose with acid dyes by using a mixture of a solvent for cellulose acetate plus an organic or inorganic acid. Now this method has been extended to dyeing with dyestuffs of the other two groups, named here above, by using as a solvent an aliphatic hydrocarbon, bearing two oxygen atoms, plus an inorganic and/or organic acid. An example is given for a dyebath containing a blend of Wool Fast Blue GL and Alizarine Cyanine Green GHA, 6% by volume Cellosolve and 16% by volume formic acid. The dyebath is brought from 115° F. within 30 minutes to 170° F. Other organic solvents are butylcellusolve, dioxane, diacetone alcohol, and the like, combined with formic, acetic and sulfuric acids.

References: Increasing the affinity of cellulose acetate to acid dyestuffs is brought about by adding a water miscible solvent (U. S. Pat. 2,292,433 Celanese). Dyeing acetate of cellulose with mixtures of solvents and non solvents, see also Brit. Pat. 460,575 (Celanese), further U. S. Pat. 2,095,221 (Smith): Cellusolve plus acetone.

Dyeing Cellulose Acetate, Thiocyanates Used C. 4. 07

Brit. P. 588,106
(Un. Turkey Red Co., Sutton, May 14, 1947)

This invention tries to solve the problem of dyeing acetate of cellulose with non specific acetate dyestuffs in another way than the Brit. P. 589,245, abstracted here above. The process is very simple and promising: every dyestuff group can be used for this purpose. The invention does not even require any desacylating procedure. Swelling and penetrating agents have been proposed sometimes to improve the yield of the prints. Among these assistants thiocyanates were frequently mentioned for direct as well as for discharge prints. The present invention consists of applying relatively large thiocyanate quantities in dyebaths and printing pastes. According to this method it is now possible to apply acid, vat, direct and basic dyestuffs thus completing the color range of acetate dyeings and prints. No organic swelling agents (alcohols or the like) are used but an ageing process improves considerably the result. 10-25% weight of ammonium thiocyanate (or any other water soluble thiocyanate) are used in dyeing baths as well as in printing pastes. Dyestuffs, useful for this process, are enumerated in a long list. Some examples picked at random are: Substantive (direct) dyestuff: Chlorantine Fast Yellow 5 G L L (Ciba), Diazamine Bordeaux 2 BL (Sandoz); *Acid Dyestuffs:* Solway Blue PFN (I.C.I.); *Vat Dyestuffs:* Caledone Jade Green XN (I.C.I.); *Vat Dyestuffs* Solubilized:: Indigosol OR (Dur. & Hug.); *Basic Dyestuffs:* Victoria Blue B (Sandoz) and so on.

Also some dyestuffs which did not give satisfactory results are registered in this list. British gum is the preferred thickener. It is very remarkable that no addition of alkali nor a reducing substance is required in vat printing. On the other hand Rongalite ("Formosul") proved to improve the yield substantially without adding an alkaline agent. Typical examples are:

for the printing paste
20 g dyestuff
200-350 g ammonium thiocyanate
780-730 g British Gum thickener
for a padding liquor
5-20 g dyestuff
100-250 g ammonium thiocyanate
895-730 g British Gum thickener

References: Generally the affinity of dyestuffs to acetate cellulose is increased by adding water miscible, swelling solvents to the dyebath, according to U. S. Pat. 2,292,433 (Celanese). Probably the high concentration of thiocyanate has also a swelling effect. The properties of cellulose derivatives are furthermore changed, especially with respect to the ironing point, by reacting them with compounds bearing the group: -NHCN (U. S. P. 2,380,-158 Celanese) or with polyisocyanates (U. S. Pat. 2,339,912, du Pont). It can therefore be concluded that the present process is based on a far going swelling, but not desacylating action. Accordingly French P. 738,980 (Ciba) discloses in a general way that acetate of cellulose can be dyed with every kind of dyestuffs, provided that the fibers are subjected in a swollen state to the dyeing process.

Creaseproofing Textiles, Boric Acid + Boric as Catalysts G, 2, 04

U. S. Pat. 2,428,752
(Reichhold Chemicals, Inc., Hewett, Oct. 7, 1947)

Stable, water soluble resin condensates

which harden in a curing process to thermosetting products have been proposed for crease-proofing and generally for permanent finishes in former publications. The present specification discloses that new and valuable condensation products can be prepared by condensing urea and formaldehyde under controlled pH conditions in conjunction with a polyhydric alcohol, for instance glycerol or ethylene glycol. These condensates are prepared by reacting 2-2.5 mols of formaldehyde with one mol. urea, using a borax—boric acid—buffer. The reaction is carried out in two steps: in the first operation the reactants are placed in a medium which is sufficiently alkaline so that the methylol compound is almost exclusively formed. This medium consists of boric acid and borax, dissolved in water at such a ratio that a solution with a pH = 6.7 — 7.3 results (for instance 2 p. borax + 2.5 p. boric acid.) The total amount of these catalysts ranges between 0.3 — 1% calculated on the formaldehyde content. The second step consists of gradually decreasing the pH value by adding some more boric acid (1-2.5%) to the mixture. After refluxing the pre-condensate solution for some time, glycerine or glycol are added. They have the purpose to react with the excess boric acid, forming complex compounds which proved to be valuable in controlling the condensation's process. In this way a formaldehyde-urea-resin solution, condensed in the presence of borax- boric acid as catalysts, gradually acidified by adding more boric acid and stabilized with glycerol or the like is obtained. After removing part of the water by distillation a viscous, highly stable solution, miscible in every proportion with water, having a pH = 7.1, results. The normal heat used for drying impregnated sheets (the invention relates to textile finishes as well as to paper manufacture) is sufficient to give the resin its initial set.

Reference cited by the Patent Office amongst others:

U. S. Pat. 2,034,479 (A. D. Little): urea-formaldehyde resins heated in the proportion of 1:2 mols are condensed and this solution is further heated to give a clear water-soluble resin pre-condensate.

Other references are:

Reichhold Chemicals Inc. suggested in several former patents to stabilize formaldehyde-urea precondensates with polyglycols and/or alcohols, for instance: U. S. Pat. 2,377,422, 1945: urea (2.0 mol) plus formaldehyde (2.5 mol) condensed in the presence of a lower alcohol and an acid catalyst. Canad. Pat. 412,033, 1943: ureaformaldehyde condensates are reacted with ethanol to obtain more stable solutions.

U. S. Pat. 2,388,276: melamine-formaldehyde condensates are stabilized with ethylene glycol.

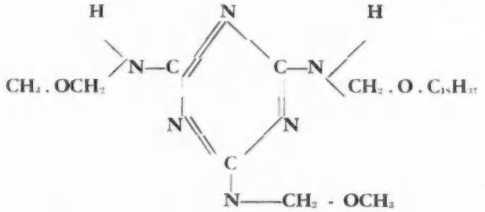
These patents seem to cover the products, known under the trade name of "Beckamines" as stabilized finishing agents.

Water Repellent Fabrics, Methylol Melamines Modified

G, 2, 02

U. S. Pat. 2, 426,770
(Am. Cyanamid Co., Grim, Sept. 2, 1947)

Methylol melamines have been used for finishing purposes, as for instance for crease and shrinkproofing textiles and for permanent finishes in general. While finishes of this type have proved to be satisfactory it is known that they have but a fair resistance to the penetration of water. They are therefore insufficient as far as their water repellency is concerned. The purpose of the present invention is to develop a finish which is shrink and crease resistant and in addition water repellent at a high degree. The new method consists of treating fabrics with dispersions of alkylated methylolmelamines (i. e. reaction products of formaldehyde—melamine pre-condensates with lower alcohols) and a higher aliphatic alcohol. By drying and curing this mixture (example 10 p. methylated methylolmelamine plus 1.5 p. octadecylalcohol) a reaction between these components is supposed to occur, based on the following theory: when a methylated methylol melamine alone is used for impregnation, the substance polymerizes in curing. The polymerizate however has no effective hydrophobic group to repel water. But in the present case an ether interchange between the melamine condensate and the higher alcohol may take place. The formula corresponding to this ether is probably



While two methylol groups remain still in the molecule enabling polymerization with other alkylated methylol molecules, the long-chain alcohol residue is not split off at curing temperature. The procedure consists therefore of condensing first formaldehyde with melamine at a pH of about 7.5, so that a methylol melamine is formed. This product is methylated with anhydrous methanol and the methyl ether resulting in this reaction is dispersed together with octadecyl alcohol and diammonium phosphate. A fabric impregnated with this dispersion, dried and cured at 290° F. became permanently water repellent, resistant to soaping as well as to dry cleaning.

Reference cited by the Patent Office amongst others:

U. S. Pat. 2,197,357 (Ciba) (misprint in the specification) describes condensates of lower alcohols, aldehydes and melamines for finishes, lacquers, etc.

Other references: Various modifications of melamine resins for changing the properties of the initial condensates have been proposed by Am. Cyanamid Company:

U. S. Pat. 2,278,363: condensation with hydrogenated methylabietate.

U. S. Pat. 2,378,364: condensation with Dammar rosin.

U. S. Pat. 2,378,365: condensation with polymeric methyl methacrylate.

U. S. Pat. 2,378,366: Rosin modified phenyl-aldehyde resins.

U. S. Pat. 2,371,892: protects the use of butylated melamine-aldehyde resins, emulsified with high substituted amines.

Drying Yarn Packages, Electrostatic Field

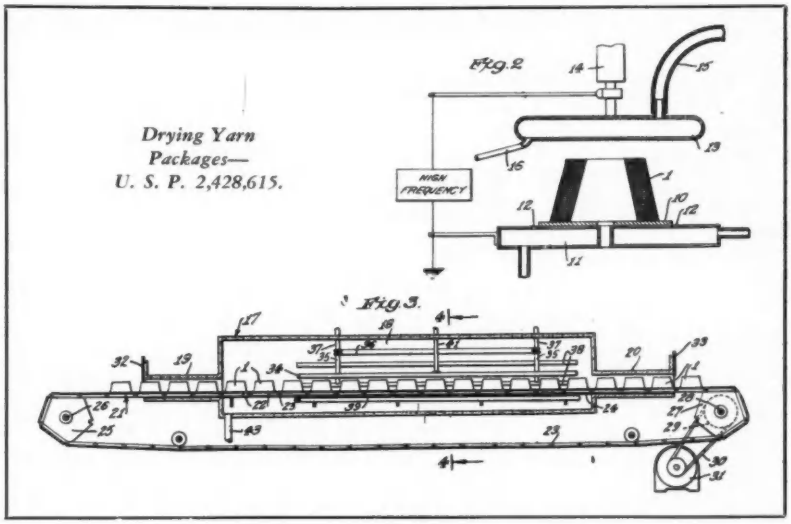
G, 3

U. S. Pat. 2, 428,615
(Skenandoa Rayonu Corp., Brown, Oct. 7, 1947)

Drying of yarn packages of rayon and especially viscose has been for a long time an important problem. Devices for drying the bobbins by simple heating, by treating them in a vacuum to remove the water at lower temperatures or by the action of high frequency electrical fields have often been described, as mentioned in this specification. It has been stated that generally the package dries more quickly on the surface than in the inner parts. Differences of tension result between the outside and the inside layers and consequently also differs in the dyeing affinities in parts of the yarns which were found to cause unevenness of the dyed threads. Since the problem of uniform drying of rayon packages was not satisfactorily solved up to now the present invention recommends a new method. Formerly it had been assumed that drying at high temperatures and at high relative humidities in the surrounding atmosphere weakens the tensile strength of viscose yarns. But the present invention comes to an opposite conclusion: highly uniform results in yarn drying are attained by re-

moving water at about 212° F. from a package in a substantially water saturated vapor atmosphere. A preferred form of the invention is illustrated in Fig. 2 of the accompanying drawings. The yarn package (1) is supported by an annular disk (10), resting on a hollow electrode (12). This electrode is maintained at the desired temperature of 212° F. by steam which also streams through holes on the surface of the electrode and fills the surrounding space with water vapors. An analogous electrode (13) located on the upper side of the bobbin is heated by connection (15). During the drying operation steam envelops continuously the package. It has been found that the maintenance of a water vapor atmosphere *prevents the evaporation* of the surface liquid at a rate faster than that in the interior portions of the package. Therefore this invention is not merely based on drying (which is said to be known per se) but on the combination of this drying method with the application of aqueous vapors at atmospheric pressure. This principle might be generally interesting also when applied to other forms of drying devices. An apparatus for continuously drying textile bodies in this way is illustrated in Fig. 3. Entrance and exit ports of the yarn packages are indicated by (19) and (20). The lower electrodes are here formed as a conveyor (22), heated by steam coils (39) while the upper electrode consists of the hollow plate (34).

Reference: French Pat. 798,814 (Geneval & St. Genis) described a hydro-extracting device using streaming vapor instead of air as a drying medium. It is supposed here that liquid portions adhering to the fibers are carried away by the steam.



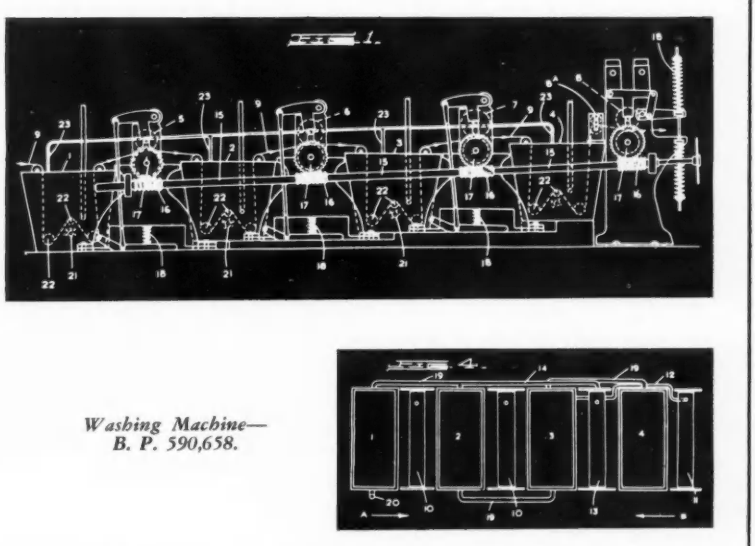
Drying Yarn Packages— U. S. P. 2,428,615.

Washing Machine C, 6

Brit. P. 590,658
(Lister & Sons, Schofield, Clark, July 24, 1947)

The present invention relates to a washing machine for piece goods consisting of several deep becks through which the fabric passes in open width. The characteristic feature is that the liquid exhausted by the different squeeze rollers between the becks does not contaminate the adjacent bath. It is drained away by a special pipe system. The construction can best be understood by looking at the accompanying drawings. The fabric (9) travels (Fig. 1) from left to right through the becks (1, 2, 3, 4) being squeezed after every passage through one of these becks by rollers (5, 6, 7, 8). On the other hand the exhausted liquid is received in trays (10, 11, 13) in (Fig. 4). The liquid from the last pair of rollers (8) being substantially clean is led back by pipe (12) to beck (3) while the strongly contaminated liquids from (1) and (2) are collected by trays (10) and carried away.

Earlier work, done in this field: U. S. Pat. 2,067,915 (Textile Dyeing and Print.) describes a dyeing and rinsing apparatus, consisting of several becks. The dyeing liquid is pumped into vessels, causing a permanent overflow and a movement of the dyeing liquid in inverse sense to the fabric's movement.

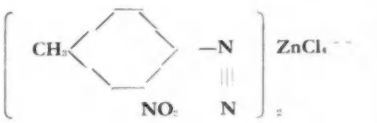


Washing Machine— B. P. 590,658.

Printing Diazonium Salts, Thinning Avoided D. 2, 04

U. S. Pat. 2,430,430
(Am. Cyanamid, Kienle, Adams, Nov. 4, 1947)

Printing pastes containing stabilized diazonium salts and a carbohydrate thickener have the tendency of rapidly thinning in storage. According to the present invention this drawback is avoided by mixing the stabilized diazonium salts for instance the zinc chloride double salt of the diazonium chloride derived from 4-methyl-2-nitroaniline (Fast Red GL Base)



with a water soluble olefin carboxylic acid amide, for instance Acrylamide:
$CH_2 = CH.CO.NH_2$,
or Crotonamide:
$CH_3CH = CHCO.NH_2$.

These amides are generally prepared by

reacting an olefinic acid chloride with ammonia or an amine.

The diazonium salts referred to here above are not to be confused with other kinds of stabilized diazonium salts such as nitroso-amines and diazoamino compounds which are stable and applied only in an alkaline medium while the diazonium salts mentioned in this specification are *stable and applied only in an acid medium.* Other reagents such as sulfonic acids of olefine hydrocarbons, esters of unsaturated acids or double bond carboxylic acids have been proposed in some patents, mostly assigned to the same company (see below). The present patent tends moreover to explain also the phenomenon of thinning. It is assumed that lowering of viscosity of the printing thickener is mostly caused in this event by the diazonium cation, because thinning occurs with every anion, even when the diazonium salts are present in the form of double salt complexes so that probably the stabilized diazonium salts are ionized in the paste to give the same cation. It is furthermore interesting to learn that this thinning action is a colloidal phenomenon rather than a chemical reaction. This has been proved by thickening a diazonium salt with starch. After a short time the starch paste became quite water thin. The diazonium salt was thereupon precipitated with a naphtholate solution and the insoluble dyestuff removed by filtration. The remaining colorless solution gave no dextrine nor sugar reaction in the iodine test but proved to contain merely soluble, non chemically altered, starch.

References cited by the Patent Office are amongst others:

U. S. Pat. 2,378,305 (Am. Cyanamid-Lechter et al.): the diazonium salt is associated with a water soluble sulfonic acid containing at least one double bond, for instance sodium propene sulfonate: CH_2: CH-CH_2 SO_3Na, to avoid thinning of the paste.

U. S. Pat. 2,378,276 (Am. Cyanamid-Adams et al.): esters of unsaturated acids, for instance mono- allyl succinate, are used for the same purpose.

U. S. Pat. 2,319,265 (du Pont-Rossander): thinning and deteriorating of this kind of printing paste is avoided by adding salts of aliphatic carboxylic acids such as maleic and crotonic acids.

U. S. Pat. 2,386,646 (Am. Cyanamid-Adams): a printing paste containing, besides the diazonium salt, a nitrogeneous base, soluble in mineral acids and substituted by one of the just mentioned double bond organic acids, added to the printing paste.

Other references are:

Brit. P. 458,808: Imp. Chem. Ind. suggests adding amino acids obtained by degrading proteins in order to stabilize diazo-printing pastes.

Adding amines or amides to the Rapid Fast printing pastes has been proposed in U. S. Pat. 2,008,966 (Rohm & Haas), but these amides are added only for maintaining the stability of the Rapidogens and Rapid Fast compositions and not for avoiding this not perfectly explained phenomenon of the loss of viscosity of starch thickeners.

Immunizing of Cellulose Fibers, Changes of Affinity A, 5

U. S. Pat. 2,430,153
(Dan River Mills, Womble, Feldmann, Nov. 4, 1947)

The present patent relates to a chemical change of cellulose fibers, brought about in order to give them an affinity for acetate dyes and to decrease or destroy their known affinity for direct or generally for all the usual cotton dyestuffs. The chemical compounds used for this reaction are characterized by the general formula: Alkyl- CO- NH- CH_2—Pyridine—chloride or similar compounds, in which pyridine may be substituted by another tertiary amine and the chlorine by another anion. This formula corresponds therefore to compounds of the "Zelan type". This fact becomes still more obvious by the examples given for some of these agents in the specification such as octadecyl-oxymethyl pyridinium chloride, stearamidomethyl pyridinium chloride and the like. It is for instance suggested to treat skeins, pre-dyed with different (red, green, yellow, etc.) vat dyestuffs with stearamidomethyl pyridinium chloride (Zelan), to dry at moderate temperatures and to cure the skeins in an oven for 3 minutes at 300° F. These skeins are sewn thereupon in a bleached cotton fabric and dyed in a direct black dyestuff solution. The treated yarns (also an undyed pre-treated specimen) were not dyed by the black dyestuff but preserved their former shade.

References cited by the Patent Office are amongst others:

U. S. Pat. 2,204,653, 2,336,341, 2,330,775 (Rohm & Haas): referring to different pretreatments with high substituted quaternary ammonium products, used as stripping agents as well as for imparting affinity for acid dyestuffs.

U. S. Pat. 2,125,901, 2,250,929, 2,278,-417; Brit. P. 459,025 (all of Imp. Chem. Ind.): relating to treatments with Velan (Zelan) type compounds for insolubilizing starch, for rendering fabrics water repellent and for using these compounds as resists under Indigosol dyestuffs.

Other references are:

U. S. Pat. 2,370,031 (Ciba): cellulose fabrics obtain an increased affinity for acid dyes by heating them at 125° C. with products of the Zelan type.

Brit. P. 501,020 (Courtaulds): pyridinium salts condensed with rosin acids give products increasing the affinity for acid dyestuffs.

The present invention is not only concerned with one of the usual processes for giving the cellulose fiber a higher affinity for other (especially acid) dyestuffs. It belongs to the so-called "Immunizing Methods". They are intended to prepare yarns with a substance destroying their affinity for the usual cotton dyestuffs and to obtain variegated effects by interweaving these yarns with non-prepared yarns and to dye the fabric in a direct dyestuff bath. By destroying the affinity for direct dyestuffs it was found that an increased affinity for other dyestuff groups (for instance basic or acetate dyestuffs) resulted. Sandoz which propagated this process (U. S. Pat. 1,523,742—Zimmeman) used as a pre-treatment agent p-toluene-sulfone chloride which combined with the cellulosic fiber. A similar effect was obtained according to U. S. Patents 1,895,544 and 1,896,892 (also Ger. P. 578,838) Ciba-Haller, Heckendorn—by a treatment with pyridine + chlorides of organic carboxylic, also with Cyanur trichloride or according to U. S. Pat. 1,875,452 (Hartmann) with phenylisocyanate + pyridine. Therefore sometimes nitrogenous bases which increase the affinity of cellulose to acid dyestuffs have the property of decreasing the affinity to typical cotton dyestuffs. The present invention seems to prove that the Zelan type agents form an additional compound with cellulose which has an unexpected affinity for the insoluble acetate dyes.

Printing Indigosols, Dispersing with Sulfobetaines or Ammonium--Amide Condensates D, 2, 04

U. S. Pat. 2,431,708
(Durand & Huguenin, Ratti, Dec. 2nd, 1947)
U. S. Pat. 2, 432,041
(Durand & Huguenin, Ratti, Dec. 2nd, 1947)

It appears that the solubility of the Indigosols (Algosols, soledons, etc.) varies widely with the dyestuff from which these sulfuric acid salts of leuco vat dyestuffs are derived. In many cases it has been suggested to add organic solvents such as thiodiglycol, ethylene glycol and so on to the paste. But certain Indigosols are so difficultly soluble that it is practically impossible to use them in the printing technique. The present invention consists of incorporating into a printing paste water soluble primary to quaternary organic bases containing one or more solubilizing COOH- or HSO_3-group. These acidic groups form "stable internal salts" with the basic group, i.e., they are not hydro-

lized in aqueous solutions. Examples for this kind of product are the sulfobetaines of quaternary ammonium salts, for instance the sulfobetaine or trimethyl-, triethyl-, or dimethyl-benzyl-phenyl ammonium sulfonic acid. Sulfobetaines, useful for this process are, for instance, prepared by treating trimethyl benzyl-ammonium sulfate with fuming sulfuric acid. The sulfobetaines contain the sulfogroup in the benzyl radical. The Indigosol dyestuff is mixed with one of these sulfobetaines, a printing paste is prepared by stirring the mixture into neutral starch thickener, to which nitrite and soda ash are added, the printed fabrics are aged and aftertreated as usual in warm dilute sulfuric acid.

References cited by the Patent Office are amongst others:

U. S. Pat, 2,302,753 (Durand & Huguenin): alkanolamine (for instance triethanolamine) salts are added to Indigosol printing pastes.

U. S. Pat. 2,217,846 (Gen. Aniline): betaine-like products are used as auxiliaries, especially as foaming agents.

U. S. Pat. 2,211,126 (National Aniline): polycarboxylic acids are incorporated into vat dyeing compositions (examples substituted succinates).

U. S. Pat. 2,205,032 (du Pont): phthalates (example sodium benzyl phthalate) are used as vat dyeing assistants.

U. S. Pat. 2,174,486 (du Pont): thioglycollic acid or derivatives thereof are added to vat dyestuff printing pastes.

The other patent mentioned above (U. S. Pat. 2,432,041) recommends for the same purpose to incorporate into a printing paste water soluble salts of *quaternary ammonium compounds* containing *at least one OH group* and water soluble acid axides. Examples for these assistants are the addition product of one mol dimethylsulfate to one mol of the trihydroxy-ethylether of triethanolamine or tetra ethanolammonium chloride. The examples teach to mix the Indigosol dyestuff with one of these quaternary compounds and to add some more for preparing the dyestuff paste.

References cited by the Patent Office are amongst others:

U.S. Pat. 2,267,609 (Nat. Aniline): small amounts of monocarboxylic acid esters (e.g. isobutyl sulfoacetate of sodium) are used for pasting vat dyes.

U. S. Pat. 2,224,280 (Durand Huguenin): development of Indigosols carried out in the presence of ammonium nitrate, used at the same time as a buffer salt and as a developing agent.

U. S. Pat. 2,184,495 (Ciba): ethyl thioglycollic acid amide is used as an assistant for vat printing.

Other references are:

Ger. P. 624,374, also French P. 777,558 (I. G. Farben): it is suggested to improve the dyeing affinity to Indigosols by preparing the fabrics with a quaternary ammonium compound (example octadecylpyridinium bromide).

Acryl Polymerizate Fibers, Dyeing with Naphthol Dyes

C, 4, 07

U. S. Pat. 2,431,956
(du Pont, Moody, Dec. 2nd, 1947)

Articles composed from polyacrylonitrile = polymerized vinyl-cyanide . . . $(CH_2{:}CHCN)_x$ . . . cannot be satisfactorily dyed by standard dyeing processes for instance by the naphthol dyeing method described in the AMERICAN DYESTUFF REPORTER 1939 p. 79-84. These methods cannot be applied to polyacryl yarns or quite generally to polymerized yarns containing the group . . . —CH_2-CH-CN. This problem has been solved by treating a polyacrylonitrile *in the gel state* in a bath containing the naphthol component, squeezing the yarn, immersing it into an acid solution and coupling thereafter the naphthol with a diazotized base. An example refers to a pre-treatment in a Naphthol AS solution plus a wetting agent of the Nekal type and to a subsequent immersion in dilute (10%) sulfuric acid. Dyeing consists of an aftertreatment in diazotized chloraniline. The "gel state" is defined as the condition of the freshly spun yarns before the gel structure has collapsed, for example the phase where the yarn, spun into a glycerol bath and washed with plain water, contains still about 100% water its own weight.

Reference cited by the Patent Office amongst others:

U. S. Pat. 2,216,793 (Celanese): production of colored artificial silk, carried out in two baths, the first one containing the dyestuff, the second having increased coagulating strength.

Other references are:

Can. P. 440,884 (Can. Ind. Lib.): polymers of methyl methacrylate are dyed with butanol containing dyestuff dispersions. Woodruff (AMERICAN DYESTUFF REPORTER 1946, p. 194) discusses dyeing of Vinyon yarns by dissolving naphthol and base in the same bath. The coupling process is carried out in a warm acidulated nitrite solution. But the depth of the shade is said to fall short of the usual (dark blue or black) shades.

TRADE NOTES • NEW PRODUCTS

• Textile Research Conference

The Gordon Research Conferences, sponsored by the AAAS, formerly known as the Gibson Island Research Conferences, for 1948, will be held from June 21 to September 3 at the Colby Junior College, New London, New Hampshire. The entire facilities of the College have been made available for the Conferences. W. George Parks, Rhode Island State College, Kingston, Rhode Island, is director.

Purpose

The Gordon Research Conferences, AAAS, were established to stimulate research in universities, research foundations and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and free discussion groups. It is desired to stimulate informal discussions among the members of a Conference by allowing considerable time for recreation. Meetings are held in the morning and in the evening, Monday through Friday, with the exception of Friday evening. The afternoons are free for recreation, reading, resting, or participation in discussion groups as the individual desires. This type of meeting is a valuable means of disseminating information and ideas which otherwise would not be realized through the normal channels of publication and scientific meetings.

It is hoped that each Conference will extend the frontiers of science by fostering a free and informal exchange of ideas between persons actively interested in the subjects under discussion. The purpose of the program is not to review well known fields of chemistry, but primarily to bring experts up to date as to the latest developments and to provoke suggestions as to underlying theories and profitable methods of approach for making new progress.

Registration and Reservations

Those interested in attending the Textile Conference which will be held from July 19 through July 23rd are requested to send in their applications to the Director, on or before April 20. Each applicant must state the institution or company with which he is connected and the type of work in which he is most interested. Attendance at each Conference is limited to 100 individuals.

The Director will submit the names of those requesting attendance to the Chairman of the Conference. The Chairman, in cooperation with a Program Commit-

tee, will review the names and select the members in an effort to distribute the requests as widely as possible among the various institutions and companies represented. The names selected will be returned by the Chairman to the Director, who will notify those accepted at least six weeks prior to the Conference requested. A registration card will be sent with the notice of selection. Advance registration by mail for each Conference is required. On receipt of the registration card and a deposit of $25.00, made payable to the Gordon Research Conferences, AAAS, registration will be completed. The deposit of $25.00 will cover the registration fee of $10.00 and $15.00 to be credited against room and meal charges.

The first meeting of the Conference is held Monday morning at 9:30 o'clock. The morning sessions, through Friday, are scheduled from 9:30 a.m. to 12:00 noon. The second session of each day is held in the evening from 7:30 to 10:00 p.m., Monday through Thursday. There are no Friday evening sessions.

Requests for attendance at the Conferences, or for any additional information should be addressed to W. George Parks, Director, Department of Chemistry, Rhode Island State College, Kingston, Rhode Island. From June 15th, mail should be addressed to Colby Junior College, New London, New Hampshire.

The program for the Textile Conference is as follows:

ROSS C. WHITMAN, Chairman
J. H. DILLON, Vice-Chairman

July 19

JULES LABARTHE, JR. Recent Researches at Mellon Institute of Significance to the Textile Industry.

I. FANKUCHEN. New Data and Interpretations of X-Ray Studies of Fibers.

July 20

WALTER J. HAMBURGER. New Techniques for Analyzing the Elastic and Creep Properties of High Polymers.

W. JAMES LYONS. Dynamic Properties of Filaments, Yarns and Cords at Sonic Frequencies.

July 21

HOWARD J. WHITE. Sorption and Swelling Phenomena of Natural and Synthetic Fibers.

DONALD ENTWISTLE. Aut-Oxidation of Alkali Cellulose.

July 22

GEORGE H. FREMON. Vinyon N Fibers.

I. J. GRUNTFEST. Recent Studies of the Cellulose-Formaldehyde Reaction.

July 23

ANTHONY M. SCHWARTZ. New Concepts of Detergency and Their Application in Textile Processing.

• Votator Division Representative

Jack K. Kennedy, who has been appointed a sales representative of the Votator Division of the Girdler Corporation, Louisville, Ky., and assigned to the staff of Sam N. Welsh, Eastern sales manager, 150 Broadway, New York. A native of Fort Wayne, Ind., Mr. Kennedy received his B. S. degree in mechanical engineering from Rose Polytechnic Institute in 1942. Immediately after graduation he entered the Army's ordnance department. He served as a first lieutenant in the European Theater, and is now a captain in ORC. He joined the Votator Division on February 14, 1946. He began as a draftsman, and later became a project engineer. He is a member of ASME and Alpha Tau Omega.

• Resigns from Perkins

William Woosnam resigned as general sales manager of B. F. Perkins & Son, Inc., Holyoke, Massachusetts, effective March 1.

• General Aniline Licenses Offered

Jack Frye, President of General Aniline & Film Corporation, has announced that that Company would offer licenses to the public under some 3,500 patents.

Included in the offer will be patents in the dyestuffs, photographic, industrial chemical and textile fields. The offer contemplates the granting of non-exclusive licenses on reasonable terms.

The Company will prepare abstracts of the available patents and will publish a brochure containing these abstracts for the benefit of prospective licensees. The offer will be further implemented by entry of the patents on the Register of Patents Available for Licensing or Sale maintained by the Patent Office in Washington. Applications for licenses will be entertained at the Office of the Company at 230 Park Avenue, New York 17, N. Y.

Mr. Frye stated that the Company's offer was worked out in conjunction with the Office of Alien Property, Department of Justice, which controls the Company by reason of the vesting of more than 90% of the Company's capital stock. The offer is viewed as an important step in providing small businesses with an opportunity to enter the fields affected and in promoting competition in those fields. The Management believes that the program will be in the best interests of the Corporation as well as of the public.

• PTI Alumni Dinner

It was announced recently by Leon P. Brick, President of the Philadelphia Textile Institute Alumni Club of New York, that the Club will hold its Annual Spring Dinner on the evening of April 22nd at the Building Trades Club Rooms at 2 Park Avenue. Mr. Brick, Vice-President of the Onyx Oil & Chemical Company, further stated that an outsanding Executive in the Textile Industry will address this gathering.

On behalf of the New York Alumni Club, Mr. Brick extended the invitation to attend the Dinner to all members of the Club, Alumni of the Institute, and guests in the industry. The New York Club has been steadily growing and now numbers over one hundred and fifty active members. Serving with Mr. Brick on this Dinner Committee are: Edgar L. Schlesinger, Cohn-Hall-Marx Co.; Arthur Ernst, Textron Inc.; Edwin Wilkinson, National Assn. Wool Manufacturers; Edward S. Lukens, Cannon Mills; Max Schuster, Cantor Greenspan Co., Inc.

• Board Member, Bocon Chemical

Directors of the Bocon Chemical Corp. have elected John B. Wathey as a member of the Board, Ernest J. Conway, president, announced recently. Mr. Wathey is vice president in charge of research and development of the company, manufacturers of Boconize, durable mothproofing compound for the textile industry.

• Flat Bed Press

To meet a requirement for a flat bed press to be used by textile laboratories in conducting shrinkage tests using procedures outlined by the American Association of Textile Chemists and Colorists and Federal Specification CCC-T-191a, the

United States Testing Company, Inc., 1415 Park Avenue, Hoboken, N. J., has developed an improved flat bed press.

The improved flat bed press can be furnished for operation using 110 V. or 220 V. current. A thermostat maintains the uniform temperature required. The size of this press permits the flat pressing of a 20" x 20" square and smaller.

No special installation is required. The press can be located on a laboratory table and plugged into the nearest electrical outlet. It is stated that it is easy to operate, saves time and permits more accurate measuring of the test specimen.

Descriptive literature is available.

• Delta Kappa Phi Convention

The Delta Kappa Phi Fraternity will hold its Annual Convention at the Germantown Cricket Club, Manheim and Morris Sts., Germantown, Pa., on Saturday, April 10th. The convention is being sponsored by Alpha Chapter of the Philadelphia Textile Institute.

A business meeting will be held at 2:00 P.M. and there will be a banquet and entertainment in the evening.

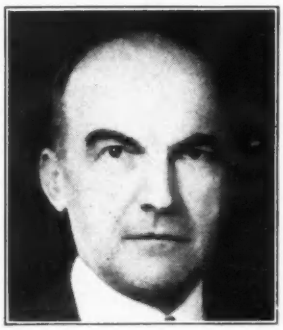
Representatives from Delta Chapter at New Bedford Textile Institute, Alpha Chapter at Philadelphia Textile Institute, Beta Chapter at Lowell Textile Institute, and alumni members from the United States and Canada will attend.

• New Avisco Publication

"Spinning Rayon Staple on the Cotton System", the first basic American handbook on the subject, has been published by the American Viscose Corporation's textile research department at Marcus Hook, Pa. It is a compilation of technical data accumulated by the corporation through thousands of studies since it began producing rayon staple in 1935. The first chapter tells the extraordinary story of the development of rayon staple from a novelty in the twenties to a U. S. production in 1946 of 150,000,000 pounds.

The 148-page book contains detailed information of importance to fabric designers and processors as well as to spinners. There are chapters on how rayon staple is made, with a production flow chart; on the general properties and physical characteristics of Avisco rayon staple; on the various types and sizes made; on weaving spun rayon yarns; on stock, yarn and piece dyeing, on printing spun rayon fabrics, and a discussion of the great variety of those fabrics. Samples of a number of these are pictured in full color. A table gives the specifications for weaving thirty-one standard fabrics from challis to suitings.

• Retired by Sandoz



Dr. John Ernest Meili, who, having reached the age limit, has been retired by the Sandoz Chemical Works, Inc. He served with Sandoz upward of 10 years, as a technician to the dyeing and finishing trade. Previous to this he had been chief chemist of the United Piece Dye Works. Dr. Meili intends to remain active as a Consulting Chemist.

The book is not only fully indexed but also contains a special index to thirty-five figures or charts, plus an explanation of the various terms used in them. Most of these charts are grouped just ahead of the index.

"Spinning Rayon Staple on the Cotton System" will be sent free to all technically qualified people who request it of American Viscose Corporation, 350 Fifth Avenue, New York 1, New York, on their business letterheads.

• Conference on Test Methods

At a conference in New York on March 12th, national organizations concerned with manufacture, testing, processing, and distribution of textile materials asked the American Standards Association to arrange for representation at the first meeting of the Committee on Textiles of the International Organization for Standardization. This meeting will be held June 7 through 12, at Buxton, England, immediately following the annual convention of the British Textile Institute. American delegates to the international meeting are invited to attend the British meetings. Industrial, technical, and educational groups in the textile field will be invited to name the American delegates.

Because of the large number of textile test methods which have been developed in the United States and the extensive laboratory and research facilities in this country, the American delegation will be instructed to ask that the secretariat for the international work on textile test methods be assigned to the United States. They will also ask for the secretariat for the international definition of rayon.

It was pointed out at the conference that the work of the International Organization for Standardization will be directed toward correlating the standards of the various member countries rather than setting up international standards. The secretariat for a project carries with it responsibility for seeing that the work on the project moves forward. The ISO is made up of the national standardizing bodies of 26 countries.

Representatives of the following groups took part in the conference:

National Federation of Textiles; The Rayon Yarn Producers Group; National Retail Dry Goods Association; American Council of Commercial Laboratories; Textile Section, New York Board of Trade; American Society for Testing Materials; American Association of Textile Technologists; Textile Distributors Institute, Inc.; American Society for Testing Materials; National Bureau of Standards.

• Editor and General Secretary, SDC

Cyril J. W. Hooper was appointed Editor and General Secretary of the Society of Dyers and Colourists at the beginning of 1948. Dr. Hooper was born in London in 1913, and received his education at Tottenham County School and the Royal College of Science, where he obtained the degree of A.R.C.S., B.Sc. with Honors in Chemistry, and Ph.D., D.I.C. in Physical Chemistry. After some experience in industry, he became reader with Messrs. Charles Griffin & Co. Ltd., for whom he edited a wide range of scientific and technical text-books. He later became Tutor in Chemistry at University Correspondence College, Cambridge, where amongst other activities he prepared a new course covering the whole chemistry syllabus for the B.Sc. Special examination of the University of London. His last post was as Librarian and Information Officer in the Research and Development Department of Ascot Gas Water Heaters, Ltd.

• Philadelphia Quartz Representative

The Philadelphia Quartz Company announces the appointment of Miller E. Barton to its sales staff. Mr. Barton has assumed duties as a representative in the Midwest territory. He is residing at 1705 Arlington, Independence, Missouri.

Discharged from the Naval Services as a Lieutenant (JG) in 1946, Mr. Barton returned to the University of Missouri where

he finished his course and obtained a Bachelor of Arts Degree in Chemistry. After joining the Philadelphia Quartz Company, he completed a period of technical and sales training involving the uses of silicates of soda in industry.

Mr. Barton's territory will include the states of Kansas, Missouri, Nebraska, and Iowa. He will assist Mr. Clement F. Lovely, senior representative in this area.

• Lithium Hypochlorite Report

A comprehensive report on Lithium Hypochlorite has been prepared by the Product Development Department of The Solvay Process Division, Allied Chemical & Dye Corporation, and is designed to give prospective users accurate data on the chemical and physical properties of this material.

Since Lithium Hypochlorite is not being made commercially, this report has been prepared primarily for technical and research men as a guide to possible applications in such fields as farm and industrial sanitation, home laundering and bleaching, and in specific germicidal and fungicidal applications.

A free copy of this book may be obtained by writing Product Development Department, The Solvay Process Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y.

• DCAT Dinner

Over 2100 persons in the drug, chemical, cosmetic and related industries from all parts of the country attended the 22nd Annual Dinner of the Drug, Chemical and Allied Trades Section, New York Board of Trade, Inc., held Thursday, March 11th in the Grand Ballroom of The Waldorf-Astoria. Fred J. Stock (Vice-President, Chas. Pfizer & Co., Inc.), Chairman of the Section, presided.

The principal speaker was Leland Stowe, foreign correspondent and author, who addressed the gathering on the subject of conditions "Behind the Czech Tragedy".

Lloyd I. Volckening (President, The Ivers-Lee Co.) was in charge of Dinner Arrangements. Robert B. Magnus, (Vice-President Magnus, Mabee & Reynard, Inc.) headed the Reception Committee. Officers of the leading national associations related to the drug, chemical and cosmetic industry were seated on the dais.

The Drug, Chemical and Allied Trades Section, New York Board of Trade, Inc., is composed of more than 725 firms, comprising 16 divisions of the drug, chemical, cosmetic and related fields.

• Arnold, Hoffman Promotions

Arnold, Hoffman & Co. Incorporated, announces the promotion of Earle D. McLeod to the post of Assistant to the President. Mr. McLeod has been Research Director at Arnold, Hoffman since 1942. He is succeeded in that position by Chauncey E. Allard, who previously acted as Research Supervisor.

Earle D. McLeod

Mr. McLeod graduated from M. I. T. in 1933 and first worked in the laboratories of Pacific Mills. He later was in charge of production and laboratories at the Masury-Young Co., in Charleston, Massachusetts, and came to the research staff of Arnold, Hoffman in 1938.

Chauncey E. Allard

Mr. Allard graduated from R. I. State College in 1936 and took his M. S. in 1938. He was employed by Schering Pharmaceutical Corporation for four years before coming to the Arnold, Hoffman research staff in 1942. He has worked with Mr. McLeod ever since and was made Research Supervisor in 1946.

Both men have their offices in the Providence headquarters of the company.

• Harris Research Additions

The Harris Research Laboratories, Washington, D. C., announce the following additions to their staff: as research associate, Thomas Eble, bio-chemist; as laboratory technician, Virginia Giles. Mr. Eble was formerly employed at the National Bureau of Standards and at the Food and Drug Administration of the Federal Security Agency, where he worked on anti-biotics. Miss Giles has specialized in home economics.

Announcement is also made of the acquisition of an additional 3,000 square feet of floor space. The new space will be used to expand present library and machine shop facilities and to accommodate a new physics laboratory.

• Standards for Nylon Hosiery

Hugo Hemmerich, Berkshire Knitting Mills, Reading, Pennsylvania, representing the National Association of Hosiery Manufacturers, has been appointed chairman of a newly organized committee to develop standards for women's nylon hosiery under the procedure of the American Standards Association. The National Association of Hosiery Manufacturers is sponsoring the work of the committee. Edmund L. Lauber, No Mend Hosiery, Inc., Philadelphia, also representing the Association, is secretary.

Representatives of manufacturers, distributor, and consumer groups are members of the committee.

• Atlas Takes Over National Weathering Unit

An announcement has recently been made by the National Carbon Co. that the Atlas Electric Devices Co., 361 W. Superior St., Chicago, has taken over the manufacture and sales of the National Weathering Unit Model X1A including repair parts, supplies and service to present users. Atlas is well known in the field as the originator of weathering and fading equipment, and for over twenty-five years has manufactured the Weather-Ometer, Fade-Ometer and Launder-Ometer.

Atlas is now redesigning the Model X1A to incorporate the automatic cycling and other control features of the Atlas Twin-Arc Weather-Ometer but is retaining as a light source the well-known National Sunshine carbon arc. This redesigned weathering unit will be an addition to the regular Atlas line of Weather-Ometers, Fade-Ometers, and Launder-Ometers.

The publication of this issue was delayed due to a work stoppage in New York printing shops.

SANDOZ PRESENTS *the color achievement of the month*

Cornfield Covert BY MILLIKEN

Rosenblum of California made up this suit and topper from Milliken's 100% virgin wool covert — a sleek, fine-textured fabric that sends a young lady into April with feel-right, look-right confidence.

The color is called "Cornfield"... Milliken's idea of the "light look" for spring. And for the dyestuffs that make such colors possible — clear and true and fast-to-wear — Milliken includes Sandoz among its suppliers. From the broad Sandoz line, Milliken selects colors which please boss dyers for their efficient processing properties as much as they please designers for their fashion-rightness.

For clear light shades on ladies' wear, many mills standardize on —

ALIZARINE LIGHT BLUE 4GL
AZO RUBINOLE 2GS
XYLENE LIGHT YELLOW 2G

The level dyeing of this combination minimizes seconds and re-dyes and produces maximum light fastness for acid piece dyes.

For acid, chrome or direct dyes... or auxiliary chemicals... for both natural and synthetic fibres... be guided by the successful "color achievements" you see in these Sandoz advertisements.

You are invited to call upon our application laboratories.

SANDOZ CHEMICAL WORKS, INC., 61 VAN DAM STREET, NEW YORK 13, N.Y.
Application laboratories and stocks at Boston, Philadelphia, Charlotte, Los Angeles, Toronto. • Other branches at Providence, Paterson, Chicago.

SANDOZ *thinks ahead with textiles*

SANDOZ

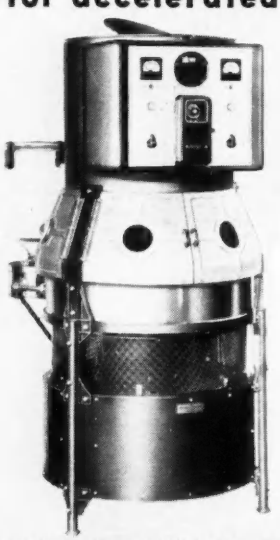
for Improving softness and handle of TEXTILES . . .
Improving affinity of dyestuffs . . .
Protecting dyestuffs from action of copper equipment

KOPPERS *Ammonium Thiocyanate*

greatly increased whiteness
lower content of insolubles
Phone or send in your inquiries.
Samples gladly furnished.

KOPPERS COMPANY, INC.
TAR PRODUCTS DIVISION
Pittsburgh 19, Pa.

FADE-OMETER
for accelerated color fading

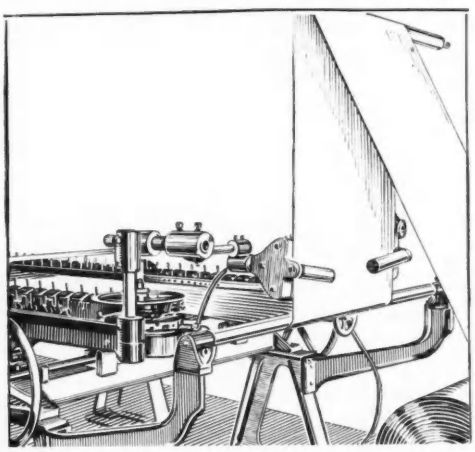


• Originated and made solely by Atlas. Used all over the world and accepted as the standard color testing machine by the textile industry for over a quarter of a century.

Specimens are rotated around the Atlas Enclosed Violet Carbon Arc the closest approach to natural sunlight. Temperature automatically controlled. No loss of light intensity of arc during life of machine.

ATLAS ELECTRIC DEVICES CO., 361 W. Superior Street, Chicago, Ill.

ATLAS-OMETERS
WEATHER-OMETER ★ LAUNDER-OMETER ★ FADE-OMETER



Reduces Seconds

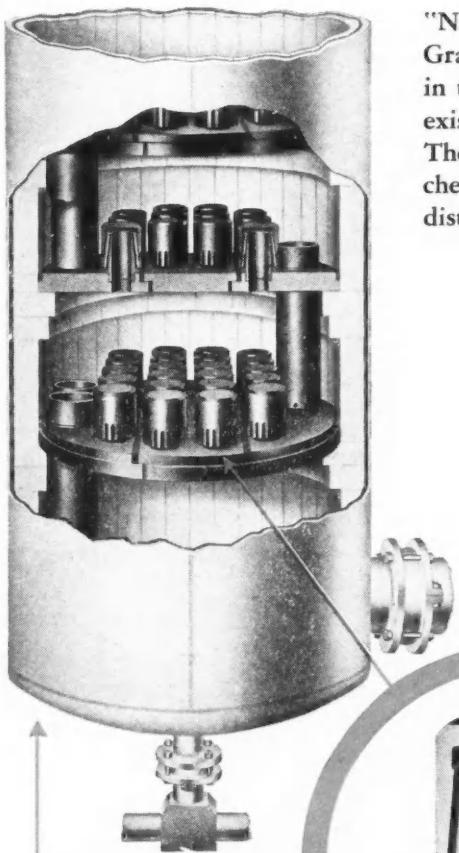
Put Foxwell Guiders to work in your mill and count your profits in fewer seconds, lower production costs. Selvedges are kept even automatically. Can be used with any machine into which cloth is fed between rollers. Operate on air pressure of 15 to 17 lbs.

H. W. BUTTERWORTH & SONS COMPANY
Serving the Textile Industry Since 1820
Main Office and Works: Philadelphia 25, Pa.

Butterworth

THEY'RE ACID-PROOF AND ALKALI-PROOF!

"NATIONAL" GRAPHITE BUBBLE CAPS AND TRAYS



"National" Graphite and "Karbate" Impervious Graphite bubble caps and trays last equally well in towers where either acid or alkaline conditions exist or where these conditions exist alternately. They are widely used in the organic and inorganic chemical fields, in scrubbing, absorption, and distillation towers.

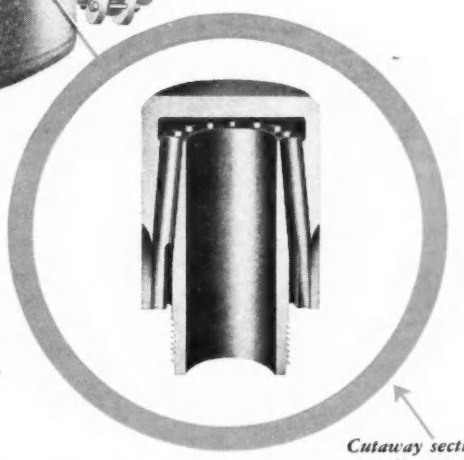
OTHER ADVANTAGES ARE:

1 Easier to install because of the one-piece bubble cap-construction.

2 Light weight with adequate strength.

3 Highly resistant to thermal shock.

4 No metallic contamination or plugging of slots by the products of corrosion.



A typical installation of "National" bubble caps and trays in a brick-lined tower. Monolithic or fabricated trays are easily adapted to all types of tower construction, including standard "Karbate" towers.

Cutaway section of a "National" bubble cap, illustrating the exceptionally strong one-piece construction.

The terms "National" and "Karbate" are registered trade-marks of

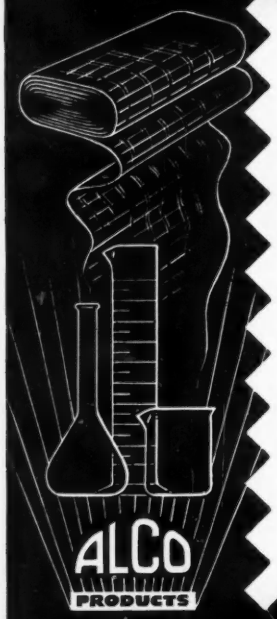
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N. Y.
Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

These products sold in Canada by Canadian National Carbon Company Limited

FOR MORE INFORMATION ON "NATIONAL" GRAPHITE AND "KARBATE" IMPERVIOUS GRAPHITE BUBBLE CAPS AND TRAYS, WRITE TO NATIONAL CARBON COMPANY INC., DEPT AD.



VULCANOLS

for sizing and finishing

VULCANOLS have proven to be efficient for the production of durable, flexible finishes on tickings, shade cloths, book cloths, baggings, pile fabrics, hair cloths, label cloths and carpets.

for starch sizing mixes

VULCANOLS are economical plasticizers and binders providing finishes of increased resistance to mechanical removal.

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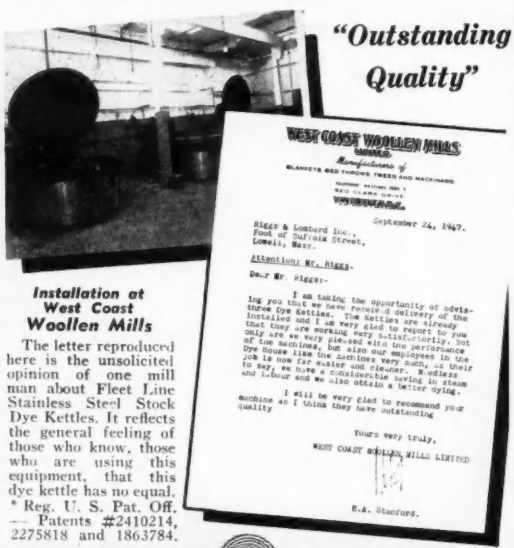
SOUTHERN DISTRIBUTORS
WICA COMPANY INC.
CHARLOTTE, N.C.

The Fleet Line

*STAINLESS STEEL STOCK DYE KETTLE

"Outstanding Quality"


WEST COAST WOOLLEN MILLS
Manufacturers of
September 24, 1947.
Riggs & Lombard Inc.,
Foot of Suffolk Street,
Lowell, Mass.
Attention: Mr. Riggs.
Dear Mr. Riggs:
I am taking the opportunity of advising you that we have received delivery of the three Dye Kettles. The Kettles are already installed and I am very glad to report to you that they are working very satisfactorily. Not only are we very pleased with the performance of the machines, but also our employees in the Dye House like the machines very much, as their job is now far easier and cleaner. Needless to say, we have a considerable saving in steam and labour and we also obtain a better dying.
I will be very glad to recommend your machine as I think they have outstanding quality.
Yours very truly,
WEST COAST WOOLLEN MILLS LIMITED
E.A. Stanford.

Installation at West Coast Woollen Mills

The letter reproduced here is the unsolicited opinion of one mill man about Fleet Line Stainless Steel Stock Dye Kettles. It reflects the general feeling of those who know, those who are using this equipment, that this dye kettle has no equal.

* Reg. U. S. Pat. Off. — Patents #2410214, 2275818 and 1863784.

RIGGS AND LOMBARD
INCORPORATED
FOOT OF SUFFOLK ST., LOWELL, MASS.

KALPINOL

TROUGH SOLUTION FOR KNITTING NYLON

Knitting Mill Conditions Vary Greatly
Nylon Thrown by Different Throwsters Varies

It has been necessary for us to make several types of KALPINOLS to meet these conditions.

One knitting mill has all nylon yarn from the same throwster but mill conditions are different in three sections of the mill, necessitating the use of three types of KALPINOL, each giving equally good results in the section in which it is used.

Let us help you.

•

For cleaning nylon size from your needles, sinkers, bits, etc., use K.N.K. (KALI NEEDLE KLEANER). It can be used straight or mixed with equal parts of water without separating.

•

HYDROXY HAND CREAM—for operators handling nylon, to keep their hands smooth.

•

KALI MANUFACTURING COMPANY
Manufacturing Chemists
427 Moyer St. Philadelphia 25, Pa.

Stanteosine

CATIONIC SOFTENER

STANTEOSINE is a mill tested product giving extreme softness using small amounts. Its affinity for fibers gives it greater permanency than other types of softeners.

STANTEOSINE is stable in hard water and in solutions of calcium, magnesium and other salts, making it very adaptable for heavy finishes, especially where weight is desired. It can be used over a wide pH range.

STANTEOSINE has various applications in the processing of silk, nylon, rayon, acetate, cotton and wool fabrics and all types of mixed goods. In the finishing of piece goods, and as a rinse after dyeing on raw stock, yarns and piece goods, STANTEOSINE gives a soft, silky finish free from odor.

S C.P.Inc

REG. U. S. PAT. OFF.

STANDARD CHEMICAL PRODUCTS, Inc.

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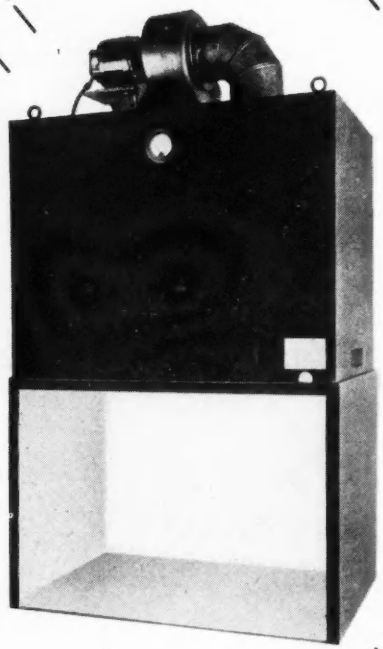
HIGH POINT, N. C. · CHATTANOOGA, TENN. · LEAKSVILLE, N. C. · PROVIDENCE, R. I. · PATERSON, N. J. · SACRAMENTO, CAL.

MACBETH

color matching skylights allow accurate, fast matching on any day, rain or shine



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227 West 17th Street New York 11, N. Y.

EXPORTERS—IMPORTERS

Aniline Colors • Dyestuffs • Pigments
and
Textile Chemical Auxiliaries

CHEM-COL COMPANY, INC.
82 WALL STREET NEW YORK (5), N. Y.
CABLE ADDRESS: COLORANTES NEW YORK. ALL CODES

LeaTex

The name that means leadership in
CHEMICAL SPECIALTIES
for the
TEXTILE INDUSTRY

"Always Reliable"

LEATEX CHEMICAL COMPANY
2722 N. HANCOCK ST., PHILADELPHIA, PA.

Flotex **FOR PRINTING**

for extremely sharp outlines

FLOTEX adds sharpness of detail and brilliance of color to the *now* look—before it is fashioned from wool, cotton and rayon.

FLOTEX remains stable in the presence of acids and alkalies. It excels in printing Rapidogen, Indigosol, Napthol, Chrome, Acid and Basic colors on all types of fabrics. It also yields jet blacks with extremely sharp outlines.

FLOTEX is a colorless, clear-cooking thickener that serves as a replacement or extender for considerably more expensive Tragacanth, Locust Bean and other natural and synthetic gums for either roller machine or screen printing. It produces a high viscosity with low solids . . . deposits only a thin film on the cloth . . . and leaves the printed portion of even the sheerest of fabrics soft and pliable.

National also produces: **FIBERTEX** for finishing sheer cotton, rayon crepes and spun rayon blends; **AMBERTEX** a heavy-bodied thickener for white discharge and vat color printing; **VAT THICKENER 36** for vat colors on cotton and rayon; **TABLE ADHESIVE** for screen printing; **FLOCK ADHESIVE 970** for chenille flock printing.

Offices: 270 Madison Avenue, New York 16; Boston, Philadelphia, Atlanta, New Orleans, Indianapolis, Chicago, San Francisco and other principal cities. In Canada: Meredith, Simmons & Co., Ltd., Toronto, Vancouver and Montreal. In Holland: Nationale Zetmeelindustrie, N. V., Veendam.

Photo Courtesy of INTERNATIONAL WOOL SECRETARIAT

National
STARCH PRODUCTS

STARCHES — AND SPECIALTIES WITH EASILY DEMONSTRATED SUPERIORITY

A New Anionic Softener

ANCAT 502

DE PAUL

RESEARCH PROGRESS

Check these advantages of ANCAT 502

- Compatible with soaps, anionic compounds (duller), resin finishes.
- Will remain soluble in mildly acid solution, down to pH 5.
- Exhaustive on cotton, rayon, and wool in the same way as cationics.
- Finish produced is equal in feel and wash-resistance to the cationics.
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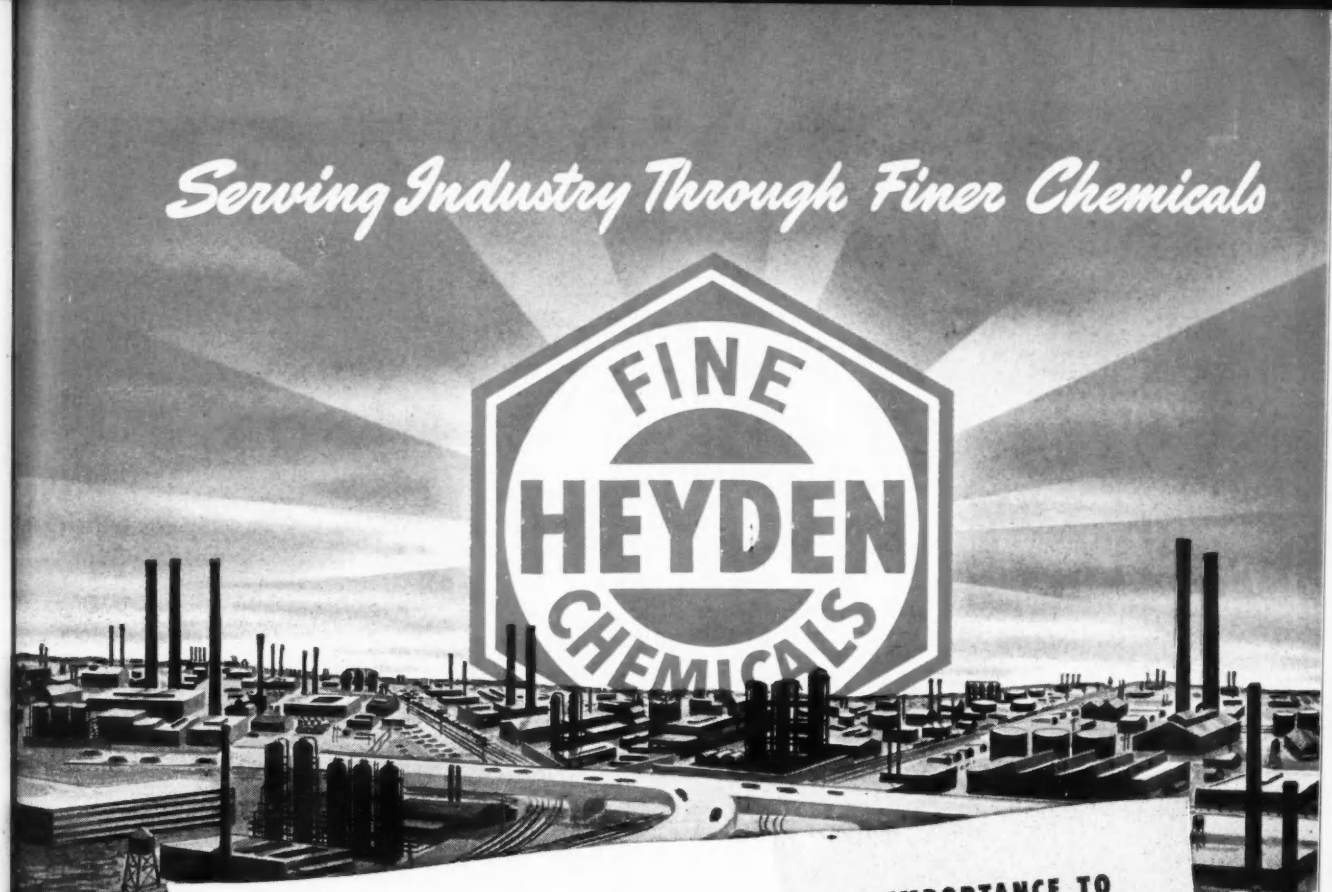

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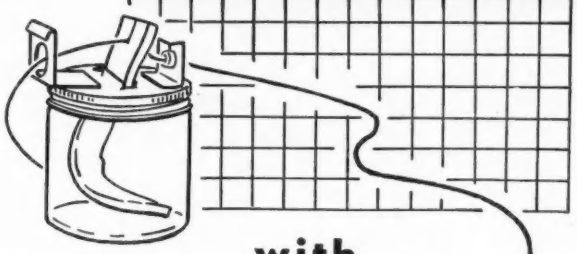

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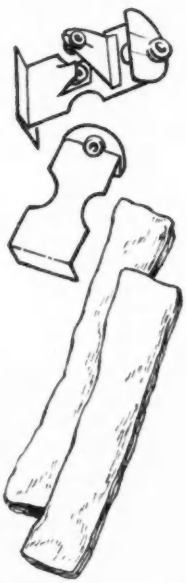

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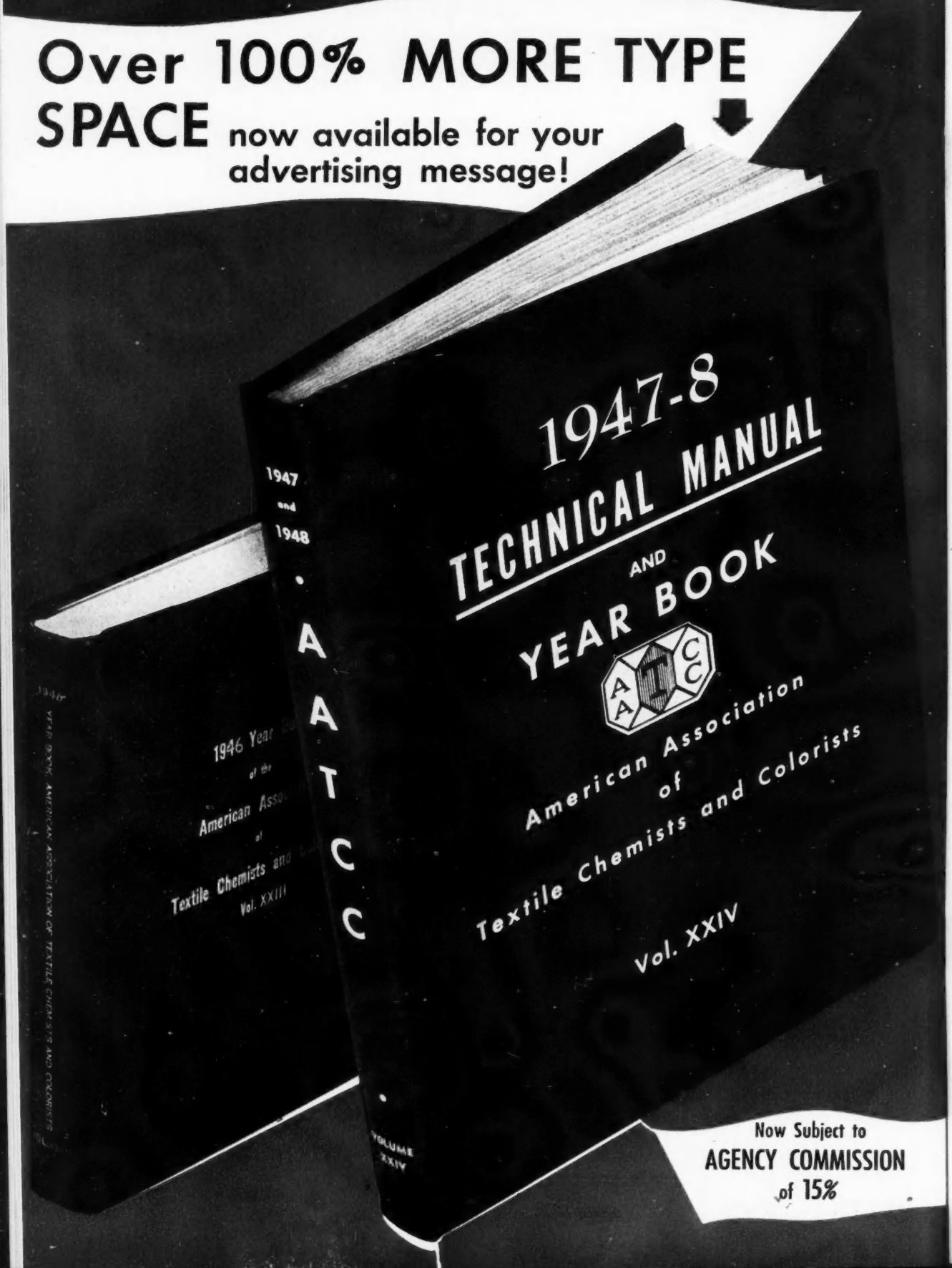

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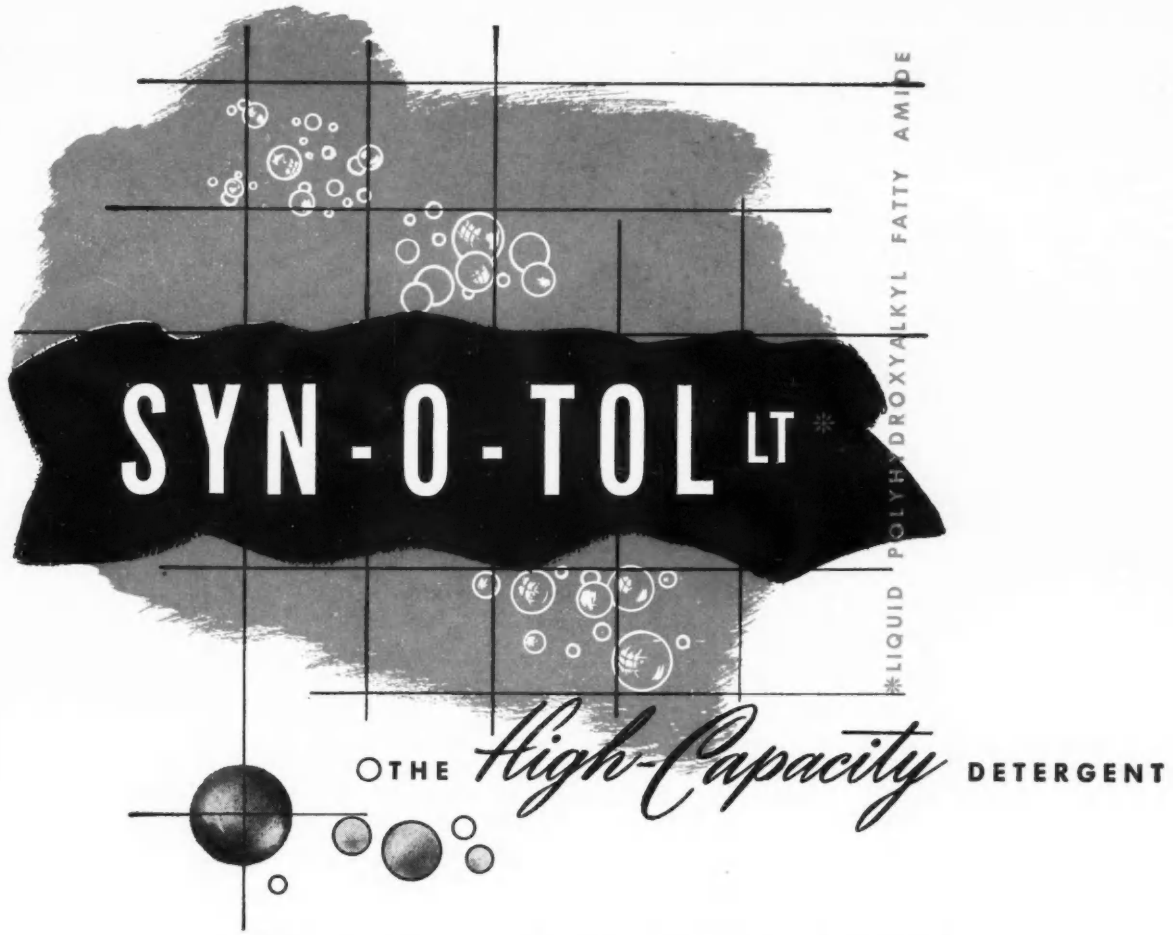

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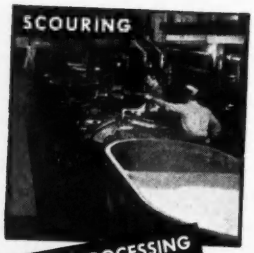

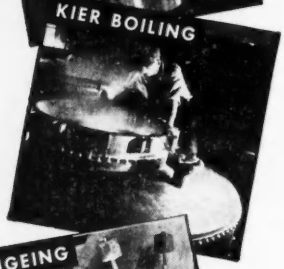

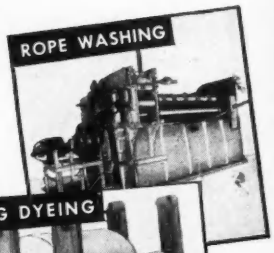

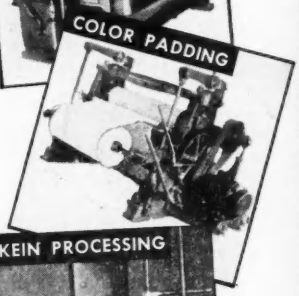

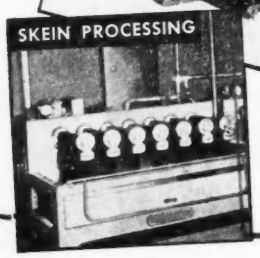

Mill men know TRITON 770 CONCENTRATE as a dependable detergent, wetting and emulsifying agent. But did you ever realize how *many* different jobs TRITON 770 CONCENTRATE does in the textile mill? Glance over the applications shown on this page . . . they show *some* of the processes in which this dependable chemical helps in making textile mill operations more efficient and more economical. Write for full information on how you can use this fine chemical to advantage.

THE SERVICE THAT BUILT OUR BUSINESS CAN HELP YOURS

Our business has been built largely on the practical help we have been able to give our customers, right in their own plants, in adapting Rohm & Haas products to their needs.

Our representatives are men with technical training and practical experience in the use of industrial chemicals. Call in a member of our textile chemicals department when you need assistance in choosing or using . . .

Chemicals for Fine Textiles

TRITON *is a trade-mark, Reg. U. S. Pat. Off.*

Represented in Canada by Rohm & Haas Company of Canada, Ltd., Toronto; and in South America by Cia. Rohm y Haas, S. R. L., Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities

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Moon-rise isn't something that's subject to "change without notice." It's certain—a *predictable* fact.

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In our 40 years of experience in producing Diastafor brand de-sizing agents, we've always borne in mind the variables that confront bleachers and dyers. Variables in water—differences in sizing formulas—bring new problems to your mill with almost every batch of goods.

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Diastafor brand de-sizing agents are available in several types to meet many different needs. They have been especially developed to work easily and well in an unusually wide range of temperatures and pH—and give you a fine flawless finish on cottons, rayons, or mixed goods.

Diastafor de-sizing is always kind to your fabrics—it won't cause impairment of tensile strength. And it's economical—you can buy more enzymes per penny with Diastafor. Write us for prices. Standard Brands Incorporated, *Diastafor Department*, 595 Madison Avenue, New York 22, New York.

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